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3986

STEPS TO KNOWLEDGE.

STEPS TO KNOWLEDGE;

OR,

Cyclopædia for Youth.

BEING

FAMILIAR EXPLANATIONS OF THINGS WE SEE, HEAR, AND READ OF.

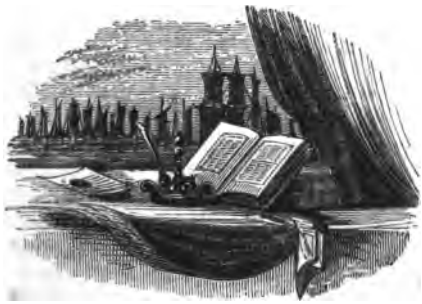
By Mrs. BOURNE,

AUTHORESS OF "THE CROOKED SIXPENCE," "SWISS PILGRIMS," "EXERTION," AND OTHER STORIES.

A New Edition,

By Mrs. BOGG.

WITH COPIOUS INDEX.



LONDON:

HODSON AND SON, 22, PORTUGAL STREET,

LINCOLN'S INN.

1859.

398b.

STEPS TO KNOWLEDGE.

I have introduced some little information on the laws and government of our own country; as well as on the wonders and wisdom of other lands.

To put these subjects into a form which would make them interesting to young people, and give them a desire for further information, has been my principal aim: to do this I have, where I could, illustrated my facts by anecdotes, which, like pictures, help to fix them on the memory. I have, also pointed out, as far as could be done in a work necessarily on so small a scale, the benefit of *Observation*, and the gratitude we ought to feel for the innumerable blessings by which we are surrounded; and I should be very happy were my little volume considered likely to lead the minds of the young to an appreciation of these, and particularly of the blessings of peace, which has both given time for such great improvements to have been thought of, and enabled them to be carried out, by allowing that free intercourse with different nations which was necessary for their accomplishment.

J. B.

Coventry, August, 1845.

STEPS TO KNOWLEDGE;

OR,

Cyclopædia for Youth.

Question. What is the meaning of the word Cyclopædia?

Answer. It means a circle of knowledge; and is formed from two Greek words, one meaning a circle and the other knowledge.

Q. Then should a Cyclopædia tell us of everything around us?

A. It should tell us something of the general productions of the globe.

Q. What is the globe?

A. The earth on which we live.

Q. Why is it called a globe?

A. From the Latin word *globus*, which means round.

Q. Who made it?

A. The great God *created* it.

Q. What is creation?

A. The origination of that which has had no previous substantial existence.

Q. As it is the duty of every one to be useful, and as all knowledge helps us to become so, I will ask you some questions about things which we daily use, see, or hear of. Tell me, first, of what this book is made?

A. The leaves are made of paper, the binding of mill-board, and the whole is covered with leather, cloth, &c.

Q. What is paper made of?

A. Linen or cotton rages; linen rags are best, being smoother and firmer. It is now also made from straw, fibrous plants, &c.

Q. How are these rags changed into paper?

A. They are first cut by women, who take off the buttons and divide all pieces more than two inches square; the second operation is dusting.

Q. How is this performed?

A. The rags are placed in cylindrical cages, enclosing a revolving axis, furnished with several spokes, the rapid motion of which shakes out the dust.

Q. What is the next process?

A. Boiling; which is performed in iron cylinders; the water in which the

rags are boiled is, in some cases, mixed with lime, and in others, with caustic soda, which unites with the grease and dissolves it, but the best paper is made only of rags boiled in pure water.

Q. What is the fourth operation?

A. Washing; which is performed by means of an engine so constructed that the rags are at the same time reduced to a state of *half-pulp*.

Q. What is the next process?

A. Bleaching; which consists in removing the half-pulp into vats of water impregnated with chloride of lime, and leaving it there until changed to a snowy whiteness.

Q. What is the sixth process?

A. That of beating; by which the rags are completely reduced into pulp of different lengths of fibre, according to the purpose for which the paper is intended.

Q. What is done then?

A. It is put into a wooden tub, or vat, and kept warm by a charcoal fire.

Q. How is this pulp made into sheets?

A. A wooden frame, the size of the

sheet required, with very fine wires in it set close together, is dipped into the pulp; and the water is thus drained from the pulp.

Q. What is the next thing done?

A. The sheet is taken out and placed on felt or woollen cloth.

Q. How do these sheets become dry and fit for use?

A. Six quires, of twenty-four sheets each, having felt between each sheet, are pressed, to squeeze out the water, and hung upon lines to dry.

Q. Can they then be written on?

A. No, they must be sized first; but in China and Japan, a glutinous substance is used, capable of being mixed with the pulp before it is moulded.

Q. What is size?

A. A substance like melted glue.

Q. What is it made of?

A. The shreds and parings of parchment, vellum, and leather.

Q. How is the size used?

A. The sheets are dipped into it, pressed as before, and again hung up to dry.

Q. What is the next process?

A. The sheets are taken down, pressed, folded, and then pressed again. Blotting paper is not sized.

Q. Have any improvements taken place on this mode of paper-making?

A. By the aid of ingenious and complicated machinery, a continuous stream of fluid pulp is now passed round cylinders, and not only made into paper, but dried, pressed smooth, and every separate sheet cut round the edges in the brief space of five minutes.

Q. What is mill-board?

A. Thick pasteboard, made by pasting together several sheets of coarse brown paper.

Q. What is brown paper made from?

A. Chiefly from old rope.

Q. What is card paper, or Bristol board?

A. It is mill-board, only made with white paper.

Q. How is the gloss produced which you sometimes see on these boards?

A. By means of hot plates of iron, and is called hot-pressing.

Q. What is printing?

A. There are many kinds of printing; state which you mean.

Q. I mean printing books, commonly called letter-press printing.

A. The art of transferring impressions of moveable types to paper.

Q. By whom was printing invented?

A. If we estimate the discovery for the invention of the principle, the honour is due to Laurence Coster, a native of Haarlem, who first discovered it by means of carved wooden blocks.

Q. Is there not some popular belief as to the origin of it?

A. Yes; it is said that Coster was amusing himself one day with cutting letters on the boughs of a beech tree, and he succeeded in transferring them to paper with ink.

Q. Is there still extant any specimen of Coster's printing from wooden blocks?

A. Yes; there is an old parchment still preserved in Germany, which has the Alphabet and the Lord's Prayer printed on it?

Q. Is it not disputed to which city in Germany the honour is due, of having

given birth to the men who claim the invention of printing?

A. Yes; Mentz, Haarlem, and Strasburg, contend for it?

Q. Who invented moveable types?

A. The discovery is due to John Gutenberg, of Mentz; and Schœffer, in conjunction with Faust, was the first who founded types of metal.

Q. How are printing-types made?

A. They are cast in moulds.

Q. What are they cast from?

A. Metal formed of lead, pewter, antimony, and other substances, which is poured in a melted state into these moulds, to form the letter.

Q. How are letters formed into words, sentences, and pages?

A. By means of an instrument, called a composing-stick, into which the letters are placed separately by a compositor.

Q. How are the letters distinguished from each other?

A. By being placed in cases which contain a great many divisions or boxes, sufficient for all the letters of the alphabet and many other characters.

Q. When the compositor has compos-

ed a great many words and lines, what is then done?

A. He forms them into pages and fixes them in an iron frame, called a chase; they are then taken to the printing-press and impressions made.

Q. How is this done?

A. A ball or roller, made of a compound of glue and treacle, upon which ink has been distributed, is then applied to the face of the types, which are pressed upon the paper.

Q. By whom was the valuable invention of printing first introduced into England?

A. By William Caxton, a merchant of London, who, by his travels abroad, had opportunities of informing himself of the whole method and process of the art. But it is supposed that a workman from Haarlem, named Corsellis, had printed with wooden types, about three years previously.

Q. About what date was it introduced?

A. In 1471. The first printing-press which Caxton set up was in Westminster Abbey, where he began to print books, the first of which was a Treatise on the Game of Chess.

Q. Is the ink used for printing the same as that we write with?

A. No; it is much thicker, and does not run, or go through the paper as that would do.

Q. What is it made of?

A. Oil, resin, and lamp black.

Q. What is oil?

A. An inflammable or greasy fluid, obtained both from animals and vegetables.

Q. Are all oils of the same nature?

A. No; there are essential or volatile oils, drawn from plants, by distillation with water, which will rise into vapour with less heat than is sufficient to cause water to boil.

Q. What others are there?

A. Fixed or fat oils, which have been obtained by pressure, and require much heat to raise them into vapour.

Q. What do you mean by inflammable?

A. Easily taking fire.

Q. What is lamp black?

A. A soot formed by burning the dregs and coarse parts of tar in furnaces constructed for that purpose.

Q. How is it collected?

A. The smoke is conveyed into boxes

which are covered with a sort of linen chimney, on which it rests, and from which it is beaten into the boxes, and then packed in barrels for sale?

Q. What causes it to have the name of lamp black?

A. Because it was originally made by means of lamps.

Q. What is linen made from?

A. A tall slender plant, with a pretty blue flower, called flax.

Q. How is it gathered?

A. It is plucked up by the roots, and laid in the sun to ripen the seeds.

Q. What is done with the seeds?

A. An oil called linseed is obtained from them by pressure, and the substance which remains is called oil-cake; used to fatten cattle.

Q. What part of the plant makes the linen?

A. The stems, which are laid in water till the soft parts begin to decay, when they are spread on the grass, and the fibrous, or thread-like portion, is easily separated from the rest by beating with a mallet.

Q. What is that?

A. A wooden hammer.

Q. What is done with these fibres?

A. They are first drawn through a coarse comb with iron teeth, and then through a finer one.

Q. Do all the fibres go through the combs?

A. No; the refuse is called tow, and is used in making packing-cloths, and in caulking ships.

Q. What is caulking?

A. Filling up every little crack or crevice, to prevent the water getting in.

Q. How is the finer part made into linen?

A. It is first spun; that is, the fibres are drawn out and twisted into a thread. This was formerly done by hand with a spinning-wheel, but now, much more quickly, by machinery.

Q. What is done next?

A. These threads are placed in a loom; some, the lengthway and called the *warp*, whilst others called the *woof*, are thrown through them, by means of a little instrument called a shuttle.

Q. Is there anything I could examine, to shew how weaving is done?

A. A piece of tape, carefully undone at one end, will shew how these threads pass alternately; that is, first over and then under the threads of the warp.

Q. Why is it called linen?

A. From the latin name for flax, *linum.*

Q. What is jute?

A. An Indian grass, much resembling coarse flax; in Dundee there are not fewer than seventy-six mills engaged in spinning jute and flax. It is used to a large extent in the manufacture of carpets and rugs.

Q. What is cotton?

A. A plant cultivated both in the East and West Indies; and bears a beautiful yellow flower, and the seeds are surrounded by a white downy substance.

Q. How is this gathered?

A. It is picked by the hand, and separated from the seeds by a machine, which also loosens the fibres; it is then packed in large bags or bales, and sent by the planter to the manufacturer.

Q. What is then done with it?

A. Women and girls take out the cotton by handfuls, and place it in the *opening* machine, it is there caught between

the teeth of revolving rollers, which separate the locks asunder, and it becomes a light downy mass.

Q. What machine is used next?

A. The *scutching* machine, by which the impurities are still further separated, and the cotton becomes lapped in a continuous sheet upon a cylinder, in which state it is called cotton wool.

Q. What is the next process?

A. The sheets go to the *carding* machine, where a number of wire combs, comb the cotton out into straight fibres, which are whipped off by a doffing apparatus, into narrow ribbons or slivers; these are joined by another machine, and again carded and doffed to equalize the substance.

Q. What machines are used to convert it into yarn?

A. The *drawing*, *slubbing*, and *roving* machines; the cotton is drawn between numerous pairs of rollers, which equalize it, and give it a slight twist.

Q. What is the self-acting mule?

A. A complex carriage between twenty and thirty feet long, with sometimes as many as eight hundred spindles, which

travels slowly to and fro, and draws out the threads to greater delicacy, and twists it till it is fine enough for *weft* threads.

Q. What machine is used for the *warp* threads?

A. The *throstle* machine, which by a different mode of action produces stronger yarn.

Q. Is any other machine used for sewing cotton?

A. Yes; the *doubling* machine, where two or more yarns are twisted one round another.

Q. How much yarn is said to be worked up in our manufactories every day?

A. Nearly two million pounds of cotton.

Q. Is cotton always white?

A. In India and China some of the plants produce a buff cotton, of which nankeens are made.

Q. What is felt?

A. A material composed of hair; that of the beaver is the best, of which beaver hats are made; felt is also used for roofing.

Q. How is it made?

A. There is a peculiar property in all hairs; they have a tiled, or scaly surface, which yields to the finger if drawn from

the root to the point, but resists, if drawn from the point to the root.

Q. What is the consequence of this property?

A. That hairs, when beaten or pressed together, begin to move in the direction of the root, and to catch hold and twist round each other, and thus form a thick mass, which is called *felt.*

Q. Is it this quality which makes woollen cloths thicken and shrink, as it is called, when they are washed?

A. It is; and the Zetlanders avail themselves of this property, and felt their wool, by putting it into narrow inlets of the sea, where it is exposed to the continual motion of the tides.

Q. What is wool?

A. Wool is the outward covering of sheep; taken off the living animal in summer by shearing, and it is then called a fleece.

Q. What is shearing?

A. Cutting this fleece off close to the animal's body, with a large pair of scissors, called shears.

Q. What is done with the fleece?

A. Each one is picked and sorted;

for the same sheep produces wool of different qualities.

Q. What takes place next?

A. The wool-comber takes it; and by means of iron-spiked combs, of different degrees of fineness, draws out the fibres, smooths, and straightens them.

Q. What is then done with it?

A. It is made into thread by the spinner: that which is the most twisted is called worsted, and the less twisted yarn.

Q. What is made of it?

A. Stuffs, blankets, flannels, carpets, cloth, stockings, shawls, and a variety of materials for ladies' dresses.

Q. Is there much trade in wool?

A. Yes; there is a great deal manufactured in this country, and it was formerly considered its principal trade. To mark its importance, the Lord Chancellor sits upon a woolsack, when presiding in the House of Peers.

Q. What is hemp?

A. Hemp is obtained from an annual plant, which thrives in a rich moist soil in temperate climates.

Q. What is meant by annual?

A. Plants which live only one year, are called annuals; those which live two years biennials, and those which live longer perennials.

Q. Does hemp grow in England?

A. Yes; in Norfolk and Suffolk, but it is a chief article of commerce from Russia.

Q. What is commerce?

A. Exchanging the productions of one country for those of another.

Q. Was not this found to be inconvenient and troublesome?

A. Very; and therefore something was adopted to pass at a fixed value, by which goods are bought and sold, and which we call money.

Q. What is manufactured from hemp?

A. Thread.

Q. How is this done?

A. In the same manner as flax.

Q. For what is it used?

A. For all purposes where great strength is required; such as the cordage and tackle of ships, and for fishing-nets, for which its toughness, pliability, and durability, make it particularly fit.

Q. Does it take much hemp to make cordage?

A. It is calculated that the sails and cordage of a first-rate man-of-war, require as much hemp to make them as would be one year's produce of four hundred and twenty acres of land.

Q. What is silk?

A. Silk is the production of a caterpillar, and is the covering it wraps itself in when about to change from the caterpillar state, into that of the chrysalis.

Q. How does the caterpillar make it?

A. It spins an oval ball, or cocoon, as it is called, from a substance which it draws out of its own body, as the spider draws her web.

Q. How are these cocoons used?

A. They are thrown into warm water to dissolve the glutinous particles which bind them, and the ends of several being found, they are wound upon a reel: this is called raw silk.

Q. What is then done?

A. It is cleaned, then twisted into threads of different degrees of fineness, and is called thrown silk.

Q, What is made of it?

A. It is woven into substances of various thicknesses, from the slightest gauze to rich velvets and brocades.

Q. Where are these caterpillars, or silkworms, found?

A. They were first know in China, and the first silk used in Europe was brought from thence: it was so expensive as to be worth its weight in gold.

Q. Where, besides in China, were silkworms reared?

A. In the East Indies, parts of Italy, the South of Spain and the Levant.

Q. Is it not said that the silkworm was taken to Constantinople in a very curious manner?

A. Yes; it is thought the eggs were carried there from China in a hollow cane.

Q. Was it always known that silk was the production of a worm?

A. No; various writers asserted that *sericum*, as silk was called, was made either from fleeces growing upon the trees, from the bark of the trees themselves, or from flowers.

Q. Which of the ancient authors gives the best account of it?

A. Aristotle; who describes the *bombyx*, (the silkworm,) as a horned worm, which goes through many transformations, and produces the *bombykia*, a stuff, which was re-spun and re-woven by the industrious women of Kos.

Q. Where is Kos?

A. It is an island in the Archipelago.

Q. Why did they take this trouble?

A. To make more of the material, as they thus converted the thick rich silks of Seres into thin transparent gauze.

Q. What do silkworms feed upon?

A. The leaves of the mulberry tree, though they will eat lettuces.

Q. Is not the silk produced in Sweden and other northern countries, superior to that of the more temperate climates?

A. Yes, both in solidity and fineness, and takes the dye as well as the best Indian silk.

Q. Did not Sir Thomas Gresham present Edward the Sixth with a pair of long Spanish silk stockings?

A. Yes; and from their rarity they were deemed worthy of much notice.

Q. Was not Queen Elizabeth much delighted by having a pair of knitted black silk stockings given to her?

A. Yes: this was by her silk woman, Mrs. Montague; but the silk trade does not seem to have improved much during her reign.

Q. When was the stocking-frame invented?

A. About the year 1589, by the Rev. Wm. Lea, of Calverton, Nottinghamshire; the invention was admired by the sovereign, but discouraged, lest it should throw the knitters out of work.

Q. What did Mr. Lea then do?

A. Henry the Fourth of France invited him to establish his manufactory in that country; but before Mr. Lea had brought it to perfection, the king was murdered.

Q. What became of Mr. Lea?

A. He is said to have died in poverty, at Paris.

Q. Has it not often happened that the inventors of machinery have been

persecuted, instead of rewarded, for their skill and ingenuity?

A. Yes; in 1680, the first stocking-looms were obliged to be set up in cellars and secret places, for fear of the knitters.

Q. What has been the result of the introduction of machinery in this country?

A. A considerable increase of employment; because machinery has reduced the cost of the articles manufactured, thus enabling a greater number of persons to buy them.

Q. Can you give me any instances of this?

A. Yes; in the middle of the last century there were only twelve million yards of cotton consumed in England: in 1850, woven cotton goods were exported to such an extent as would give an average of nearly four million yards (far beyond two thousand miles) every day. Between three and four hundred thousand persons are daily employed in the factories.

Q. Can you name any other proofs of its usefulness?

A. Yes; a century ago only few per-

sons wore stockings; in 1831, fifty thousand families were employed in making them.

Q. When was silk weaving brought into England?

A. In 1686, when nearly fifty thousand protestants fled from persecution in France; many of them being silk manufacturers, brought the art with them, and settled in Spitalfields.

Q. What are metals?

A. Metals are dug out of the ground, and are known from other minerals (which is a general name for substances thus procured,) by being malleable, laminable, and ductile.

Q. What is meant by malleable?

A. Capable of being beaten out by a hammer without breaking.

Q. What is laminable?

A. That which may be pressed into sheets by a rolling press.

Q. Ductile?

A. That which may be drawn out into a wire.

Q. In what state are metals found?

A. Sometimes pure, that is, just as you see them when used; but more

frequently they are mixed with earths, in which state they are called *ores*.

Q. How are they separated from these earths?

A. By being smelted, as it is called; that is, the ore is heated in a furnace till the metal melts and runs away from the earths.

Q. Will metals melt, or dissolve, in water?

A. No; but they can be fused, or melted, by fire.

Q. How many metals are there?

A. There are now known to be forty-three metals.

Q. Which are the seven commonest metals?

A. Gold, silver, copper, iron, tin, lead, and mercury, or quick-silver, as it is commonly called; of the others, platinum and zinc are all we need speak of at present.

Q. Will you tell me something of each of these metals? What is gold?

A. It is one of the perfect metals.

Q. What is meant by a perfect metal?

A. One which does not lose any of its weight by being fused.

Q. How do metals in general lose by being melted?

A. They leave a dull substance, called calx, when they are poured out.

Q. Which are the perfect metals?

A. Gold, silver, and platinum.

Q. Which is the most malleable?

A. Gold; it is also the heaviest, except platinum; it cannot be injured by the air, and never rusts.

Q. What quality in gold renders it malleable?

A. Its tenacity.

Q. What is tenacity?

A. Holding firmly together, not easily pulled asunder, nor broken.

Q. Are there no means of making gold lose the qualities of a metal?

A. Not by the strongest furnace; but a burning-glass will calcine it in time; electricity will also calcine it in an instant, and even change it into glass.

Q. What is meant by calcined?

A. Reduced to powder.

Q. What is the principal use of gold?

A. As coin, that is, money, to which purpose it seems to have been applied so long, that no one can tell when it

was first given in exchange for other things; and in some parts of Africa it passes as money now in its native state.

Q. What do you mean by its native state?

A. As it comes out of the mine.

Q. Do we use it in that state?

A. No; it is too soft, and would easily wear away; it is always mixed with a certain quantity of copper or silver, to give it hardness, which is called alloy.

Q. How is it made into money?

A. Money, whether of gold, silver, or copper, is only allowed to be coined at the Mint, on Tower-hill, London; and should any one attempt to imitate it, it would be called treason, and he would be punished accordingly.

Q. Why?

A. That every one may know the real value of the money he possesses, by its being always of one quality, and never made of less valuable materials.

Q. How is it coined?

A. Each blank, that is, each piece, before it has received any impression, is placed in a machine, upon which a weight is brought down with such force,

as to stamp the image on both sides of the coin.

Q. Is this done by the hand?

A. It used to be, but is now performed by complicated machinery placed in a room over the coining room, and connected with a steam engine.

Q. How is the machine supplied with blanks?

A. There is a contrivance by which it feeds itself, and removes them the instant they have received the impression.

Q. How many pieces can this machine stamp in a day?

A. It is said that one man may stamp 20,000 pieces.

Q. Is gold used for other purposes besides money?

A. The jewellers use it for the setting of ornaments.

Q. Do they use the same gold that money is made of?

A. No; it is much more alloyed, or mixed, and not nearly so valuable.

Q. For what other purpose is it used?

A. For gilding.

Q. How is that done?

A. In three different ways; by wash

or water gilding, where the gold is reduced to a fluid state by being mixed with quicksilver; by leaf gilding, where thin leaves of gold are cemented upon the work, either by size or oil: for Japanner's gilding, gold dust in powder is used, instead of leaves.

Q. To what substances is gilding usually applied?

A. To metals, wood, leather, parchment, or paper.

Q. Can gold be applied to any other substances?

A. Yes; to glass, porcelain, &c.

Q. Is not gold also made into wire?

A. Yes; or rather into what is called gold wire, for there is very little indeed all gold.

Q. How is it made thin?

A. By gilding a cylindrical piece of silver, and drawing it through a vast number of different sized-holes, till it becomes of the fineness required. By this means, one single grain of gold admits of being drawn out into a wire ninety-eight yards long.

Q. How is it that the gold does not wear away?

A. Because it is covered with wax each time it is drawn through a hole.

Q. How is this wire made flat, as it sometimes is?

A. By being passed between rollers of polished streel.

Q. Does this make gold thread?

A. Yes; by being laid over a thread of yellow silk, and twisted by a wheel and iron bobbins.

Q. How is gold leaf formed?

A. The gold having been melted with borax, and prepared by being passed between steel rollers, till it has become as thin as paper, is beaten into leaves upon a smooth block of marble, fitted into a wooden frame, about two feet square.

Q. What is then done?

A. It is cut with a steel knife into squares of an inch each; these are laid one upon another, with some animal membrane between them, to prevent their uniting, and parchment on the outside, to save them from the hammer.

Q. Are they beaten with hammers?

A. Yes; with three steel hammers of different weights, as it becomes thinner.

Q. Is there always the same membrane between them?

A. No; at first the finest vellum, made from calf's skin, is used, then one that is much finer and prepared from the inside of an ox; and this is what makes the gold-beater's skin.

Q. What is parchment made of?

A. Sheep's skin.

Q. What is now done with the gold leaf?

A. It is cut with an instrument made of sharpened cane, as it would adhere or stick to steel. It is beaten again, and then thrown flat, by another cane instrument, upon a leathern cushion.

Q. What next?

A. Each leaf is cut into shape by a square frame of cane, and then placed in a book of soft paper, each page of which has been well smoothed and rubbed over with red bole, or chalk, to prevent the gold adhering to it.

Q. How fine can gold be beaten out?

A. Such is the wonderful malleability of this metal, that it is calculated that an equestrian statue of the natural size, may be gilded with a piece of gold not

exceeding in value ten shillings; and Mr. Boyle, a celebrated philosopher, has ascertained, that one grain of gold can be beaten into leaf which would cover fifty-six square inches!

Q. What is borax?

A. A native salt, found dissolved in certain waters, and discovered in them by its brackish and bitter taste.

Q. How is it obtained from the water?

A. By evaporation,

Q. What is that?

A. Boiling the water till it rises up in vapour or steam, whilst the borax remains at the bottom of the vessel.

Q. Where is it found?

A. Chiefly in Thibet, and is brought to England from India.

Q. Where is Thibet?

A. On the borders of China, in Asia.

Q. What is the use of borax?

A. Dyers use it, to give a gloss to silk; and it is also used in medicine, and in soldering gold and other metals.

Q. How is gold found?

A. In several states; massive, that is, in a lump; in small scales; and capillary, or in small branches, but most fre

quently mixed with other substances, and is then called an ore.

Q. How is it then separated?

A. By reducing the ore to a powder and mixing it with quicksilver, which unites with every particle of the gold, but will not combine with anything except metals; so it takes away the gold from the earths with which it had before been mixed.

Q. But how is it separated from the gold?

A. By means of heat, as quicksilver is easily volatilised, that is, it is easily made to fly off in steam or vapour.

Q. Of what colour is melted gold?

A. Of a pale blueish green colour.

Q. Has any gold been found in England?

A. Not much, it is chiefly found in the hot climates; yet there has been some discovered both in Sweden and Norway, and some has been met with in the mines of Cornwall.

Q. Was it not once very common in Ireland?

A. Yes; but the gold-seeking operations in the county of Wicklow, in 1795,

cost more than the gold produced was worth.

Q. Was any ever found in Scotland?

A. Yes; mines of gold have been worked there; and it is even asserted, that at the marriage of James 5th, there were covered dishes filled with Scottish gold presented to each of the guests by way of dessert!

Q. Is any found there now?

A. Yes; sometimes a few grains, in the brooks after great floods.

Q. What is its weight?

A. More than nineteen times the weight of water.

Q. Is it easily dissolved by acids?

A. No; it cannot be melted by any, except aqua-regia.

Q. What is that?

A. A combination of nitric and muriatic acid, and called aqua regia, or royal water, from being the only acid which will melt gold, which is called the royal metal.

Q. What is it now more commonly called?

A. Nitro-muriatic acid.

Q. Is silver next in value to gold?

A. It is; being also a perfect metal, it is therefore used as money; it is alloyed with copper, which does not affect its whiteness, and makes it harder and better able to receive a fine impression.

Q. Does the air spoil silver?

A. Not unless there be sulphurous vapour or some of the gases in it, in which case the metal becomes covered with a dark brown rust.

Q. Can silver be beaten out like gold? *A*. Very nearly as much. It may be beaten out into leaves the one hundred and sixty thousandth part of an inch thick.

Q. Can it be drawn into wire?

A. Yes; much finer than human hair, and to such a length, that a single grain has been extended to nearly four hundred feet!

Q. How are plated goods made?

A. This was done formerly by laying leaf silver on heated metal, and making it adhere by rubbing; or by dissolving quicksilver in nitrous acid, and dipping whatever was to be plated into the solution.

Q. What occurred then?

A. A thin coating of silver fixed itself on the metal; copper, I think, was always used, but this was very slight.

Q. What is now done?

A. A piece of silver, about the eighth of an inch in thickness is united by heat to an inch of copper, in the shape of a brick, and they are then flattened by steel rollers, with an eighty-horse power engine.

Q. What do you mean by that?

A. A steam engine worked by power, which would require eighty horses to produce.

Q. But when the copper is pressed out in that manner, the silver, which was only an eighth part as thick, cannot surely cover it all?

A. Yes it can, because the silver is so much more malleable than the copper, that the plating would be perfect, though the copper were rolled out as thin as paper.

Q. How was plating first discovered?

A. In a very curious manner, by a spur maker of Birmingham.

Q. How did he discover it?

A. The more elegant kind of spurs

were made of silver, but this being very liable to bend, he contrived to make a pair hollow, and to fill the space with a slender rod of iron, or steel.

Q. What was thought of this plan?

A. It was found to be a great improvement, and the workman, wishing to make them still cheaper, made the hollow larger, and the iron thicker, till at length he discovered the method of coating, or covering, an iron spur with silver.

Q. What is nitrate of silver?

A. Silver which has been dissolved in aqua fortis, or nitric acid, yields crystals, and these, melted again in a crucible, form a grey mass, called nitrate of silver, or lunar caustic.

Q. Of what use is this?

A. It is used in surgery, and in making an article called permanent ink,

Q. Is silver ever found pure?

A. Yes; in many places.

Q. Where is it found in the largest quantities?

A. The mines of Mexico and Peru are said to yield ten times as much as those of all Europe together.

Q. Which are the most important mines in Europe?

A. Those of Saxony, Hungary, and the Hartz.

Q. Has silver ever been found in England?

A. Yes; in the lead mines of Cumberland, and in Yorkshire, and Cornwall.

Q. Any where else?

A. At Freyburg, in Saxony.

Q. How is this metal separated from the ore?

A. By different means in different places.

Q. How at Mexico and Peru, where you say there is the most?

A. There the ore is pounded, roasted, washed, and mixed with quicksilver.

Q. How is that done?

A. The ore and the quicksilver are put together into vessels filled with water; they are kept in motion by a mill, which causes the silver to unite with the quicksilver.

Q. How are they separated?

A. By heat, as gold is, and the pure silver is melted into bars, or ingots.

Q. You said platina was another perfect metal; why is it not used for money?

A. If platina could be obtained in large quantities, it might be, perhaps, the most valuable of all the metals, and useful in coining, but it was not known in England till the year 1738.

Q. Who brought it here, and from whence did it come?

A. Don Antonio Ulloa, from Peru.

Q. What makes it so valuable?

A. The several properties which it possesses.

Q. What are these properties?

A. It is nearly as hard as iron, and the hottest fire and strongest acids have scarcely any effect upon it.

Q. Can it be melted?

A. Not by the heat of a forge.

Q. How then?

A. It may be fused by the rays of the sun in a burning mirror, by galvanic electricity, or by a flame produced by oxygen gas.

Q. What colour is it?

A. When properly refined, something between silver and iron.

Q. What is it used for?

A. For several kinds of trinkets, as it is not liable to tarnish, like silver.

Q. Is it ductile?

A. Yes; it can be drawn into wire, like gold; and for strength and tenacity is considered preferable to either gold or silver of equal thickness.

Q. Is it used for other purposes?

A. Yes; it is made into mirrors for reflecting telescopes; into mathematical instruments; chemical utensils, as crucibles, &c.; pendulums, clock-work: it can also be rolled into plates.

Q. What important use did Sir Humphry Davy make of platinum in his safety-lamp?

A. He contrived to suspend a coil of platinum wire over the flame of each lamp, which becomes of an intense red heat the moment the flame is extinguished by the superabundance of gas emitted from the coals, called carburetted-hydrogen gas; and this affords light enough to enable the man to find his way out of the mine.

Q. For what further purposes is platina used?

A. It is sometimes beaten into leaves

and applied to porcelain, in the same manner as leaf gold, and its oxyde is used in enamel painting.

Q. What is meant by oxyde?

A. An oxyde is the rust of any metal, formed by oxygen gas, which is sometimes called vital air.

Q. Why?

A. Because it is combined in all the air we breathe, and without it we could not live.

Q. What is copper?

A. A red-coloured metal, and the most sonorous of all metals: it is on account of this quality that trumpets and other musical instruments are made of copper.

Q. Where are there copper-mines?

A. There are famous mines in the Paris mountain, near Amlwich, in Anglesea.

Q. Is it found pure?

A. Sometimes, but more frequently combined with other substances.

Q. How is it separated from these?

A. It is first calcined in a mass, then melted, and afterwards roasted; by which means the sulphur, iron, and other sub-

stances with which it is combined, are separated.

Q. What is sulphur?

A. Sulphur, or brimstone, as it is sometimes called, is a solid, opaque combustible substance of a pale yellow colour, insoluble in water, very brittle, and possessing a peculiar taste and smell.

Q. What is done with the copper ore after it comes from the kiln?

A. It is refined and toughened.

Q. Is there not another method by which copper is procured?

A. Yes; the water which passes through the mine becomes strongly impregnated with copper; this water is turned into large shallow pits, in which a quantity of iron is placed.

Q. What then takes place?

A. The iron is corroded, or converted into rust by the water, and the copper is precipitated and mixed with it by mutual attraction, and falls to the bottom in a brown powder.

Q. What is that powder called?

A. Copper mud: a ton of iron will produce nearly two tons of copper mud,

and each of these, sixteen hundred weight of the metal.

Q. Was not this method of procuring copper discovered by accident?

A. Yes; many years ago, a workman left a shovel in the water, and when it was taken out, it appeared to be changed into copper.

Q. Are the Anglesea copper works very large?

A. Yes; the beds of ore are said to be in some parts more than sixty feet in depth. The proprietors did employ more than one thousand people, and shipped from the adjoining port of Amlwich, upwards of 20,000 tons of copper annually.

Q. Is this the deepest copper-mine in Great Britain?

A. No; at Ecton, in Staffordshire, there is one now worked at the depth of 1,416 feet below the surface.

Q. To what purpose is copper applied besides coining?

A. The bottoms of ships are covered with it, to preserve them from injury, and to make them sail better; boilers,

kettles, and other vessels for cooking, are made of it, but these ought to be used with great care.

Q. Why?

A. Because acids or greasy substances, if allowed to stand and grow cold in them, combine with the copper and form verdigris, which is an absolute poison.

Q. Can this be prevented?

A. Yes; by tinning the insides of the vessels.

Q. How is this done?

A. They are cleaned with sal-ammoniac, or an acid; then tin, or tin and lead, are melted in them and well rubbed all round the inside.

Q. What is brass?

A. A compound metal, made of copper, zinc, and calamine stone, which renders it yellow and hard.

Q. What are its properties?

A. It is more fusible than copper, not so apt to tarnish, and is malleable when cold, but not when heated.

Q. Is brass ductile?

A. So much so, that sieves of extreme fineness are woven with the wire, after the manner of cambric.

Q. What is zinc?

A. A metal of a bluish white colour, somewhat brighter than lead.

Q. Is it hard?

A. Yes; and so malleable as not to be broken by the hammer; but it cannot be much extended by this means, although it can be spread out by rollers.

Q. Is it ductile?

A. Yes; it can be drawn out into wire when it is warm.

Q. Is it brittle?

A. It may be made so by being melted and poured into cold water, or by being heated till nearly fused.

Q. What is quicksilver?

A. An imperfect metal, like melted silver, very useful in medicine and various manufactures. It is also called mercury.

Q. What are its properties?

A. It is the heaviest known fluid, being fourteen times heavier than water.

Q. Where is mercury or quicksilver found?

A. In Peru, Spain, Hungary, Austria, China, and Sweden.

Q. What is a fluid?

A. A substance whose parts do not

cohere firmly, but readily yield to any impression, and have free motion among themselves.

Q. Is quicksilver always a fluid.

A. Yes; in our climate; unless frozen by artificial means.

Q. How can that be done?

A. By a chemical process; when it becomes quite solid, and is then the coldest of all fluids, but when boiling it is the hottest.

Q. Are not all fluids and liquids of the same heat when boiling?

A. No; it requires a much greater degree of heat to boil some than others.

Q. But how can that be shewn?

A. By the thermometer.

Q. What is that?

A. It is a tube of glass, with a hollow ball at one end, which is filled with quicksilver.

Q. What is a tube?

A. A hollow cylinder; the hollow part of a quill is a tube.

Q. What is done with this tube?

A. It is plunged into boiling water, when the heat causes the quicksilver, or mercury, to expand, and rise in the tube.

Q. What is then done with the tube?

A. When the mercury has risen as high as it will go, the tube is broken off at that place and hermetically sealed.

Q. What is "hermetically sealed?"

A. The end of the glass tube is heated till almost melted, then twisted together by means of a pair of hot pincers, so that not even air can enter.

Q. Of what use is the tube thus formed?

A. To hold the quicksilver; which is so readily affected by the atmosphere, as to expand or contract as the air around it becomes warmer or colder.

Q. Do you then, by the atmosphere, mean the air all around us?

A. I do.

Q. What do you mean by expanding and contracting?

A. To expand is to spread out, to contract is to shrink in; thus the sponge expands when filled with water, and contracts when squeezed dry.

Q. What is the best method of ascertaining the temperature of the atmosphere?

A. The expansion and contraction of bodies, according to the degree of heat to which they are exposed, is best adapted to indicate the degree of heat or cold.

Q. Are all bodies susceptible of this change?

A. Yes; but they are not all equally convenient, the one found most available for general purposes is mercury.

Q. How is the mercurial thermometer constructed?

A. It consists of a tube of glass with a thin bulb at one end, the bulb and part of the tube being filled with mercury, and the air carefully expelled from every portion of the tube.

Q. How is this effected?

A. By exposing the mercury to a greater degree of heat than it is ever intended to indicate, it will be proportionably expanded, and overflow until it acquires the heat desired; the end of the tube is then hermetically sealed, and the mercury gradually subsides to the temperature of the surrounding atmosphere, leaving a portion of the tube empty.

Q. How is any particular degree of heat or cold ascertained by this means?

A. The temperature at which ice melts and distilled water boils, is marked upon the scale attached to the barometer, and the distance between them divided into equal spaces called degrees; the scale is continued by equal divisions above the boiling and below the freezing points.

Q. Who invented this curious instrument?

A. A person named Fahrenheit.

Q. What else may be learned from quicksilver about the weather?

A. Barometers are formed by means of it; and they tell of changes in the weather.

Q. In what manner?

A. A glass tube, open at one end, is filled with quicksilver; this open end is put into a bowl which has some quicksilver in it also.

Q. What happens then?

A. Part of the quicksilver falls into the bowl, and leaves a space in the tube in which there is not even air.

Q. What is the consequence?

A. The atmosphere presses upon the

quicksilver in the bowl, and when the air is heavy, it forces the mercury to rise up in the tube; when light, it lets it fall back again into the bowl.

Q. Is the air heaviest or lightest during rain?

A. Lightest; for it is the air being light, and not able to support the clouds and vapour, which allows them to fall down in rain.

Q. Does the barometer shew anything else?

A. Yes; it shews the height of mountains.

Q. How can it do that?

A. The atmosphere is found lighter the higher we ascend, and thus the height is easily calculated by the fall of the quicksilver.

Q. Is quicksilver of any other use?

A. Yes; it is put at the back of looking-glasses, causing them to reflect.

Q. What do you mean by looking-glasses reflecting?

A. Their power of shewing anything placed before them, and also of throwing back light from their surfaces on other objects.

Q. How is the quicksilver fixed on the glass?

A. By means of tin foil, over which it has been carefully spread, for tin and mercury easily amalgamate.

Q. What is meant by amalgamate?

A. An amalgam is a kind of paste, formed by the mixture of mercury with any other metal.

Q. What is the black oxyde, which we see on the backs of mirrors?

A. An amalgam of mercury and tin.

Q. But how is it fixed to the glass?

A. The glass is carefully slid on to it, pressed down with weights, and in a few days they adhere firmly to each other.

Q. Is mercury useful for any other purposes?

A. Yes; vermillion is a preparation of it, and so is calomel, so much used in medicine.

Q. Is it ever found in its native state?

A. Frequently; but more often combined with sulphur.

Q. What is it then called?

A. Cinnabar; which is a red substance.

Q. Is this of any value?

A. So much, that it is often imitated.

Q. Who use it?

A. Painters; they call it native vermillion, and to make it more beautiful, they grind it with gum water, and a little saffron.

Q. Where is quicksilver found?

A. In India and Spain; but the quicksilver mines of Peru are the richest.

Q. Is there a story about the discovery of these mines in India?

A. There is; about three hundred years ago, that part of the country was much inhabitated by coopers, one of whom, when leaving off work one evening, placed a new tub under a dropping spring, to try whether it would hold water.

Q. What happened to it?

A. When the man returned in the morning, he found his tub so heavy, that he could scarcely move it, and perceived at the bottom a shining fluid, which proved to be quicksilver.

Q. What did this lead to?

A. The forming of a company, to discover and work the mine from whence it had issued.

Q. In what state is it found in the mine?

A. In some parts, flowing in small streams, so that in six hours as much as thirty-six pounds has been collected; in other parts, it is found in small globules.

Q. You spoke of tin foil, what is that?

A. The finest tin; first melted, cast into an ingot, then rolled out to a certain extent, and afterwards beaten with hammers.

Q. What is tin?

A. It is the lightest of all ductile metals; not being more than seven times the weight of water.

Q. Is it hard or soft?

A. It is harder than lead, but softer than silver.

Q. Can it be beaten out very thin?

A. Yes; into sheets only the thousandth part of an inch in thickness.

Q. How are tin plates made?

A. Thin iron plates are well cleaned by steeping them for four or five minutes in a mixture of muriatic acid and water; they are then placed in an oven, until the heat causes a thick scale to fall off;

they are next immersed in water in which bran has been steeped, then agitated in sulphuric acid and water; and finally scoured with sand in pure water, and placed in the pot containing the melted tin and a quantity of tallow, sufficient to protect them from the action of the atmosphere.

Q. In what other way is tin used?

A. Its oxyde is used in dyeing.

Q. Is it useful in any other way?

A. It forms alloys with many other metals. Combined with lead and copper, it forms pewter; with copper alone, it forms bronze: and it is remarkable, that when these two metals are melted together, the compound is heavier than the weight of the two metals taken separately.

Q. Is tin ever met with pure?

A. It does not appear that it is, though the Spanish tin found in South America is said to be superior in that respect.

Q. How is it found?

A. It occurs as an oxyde, or mixed with sulphur and copper.

Q. Where is it found in the largest quantities?

A. In England, Germany, Chili, and Mexico; also in Australia and Tasmania.

Q. Of what colour is tin?

A. Of a whitish colour?

Q. Has it long been known in England?

A. Yes; the Phœnicians are said to have traded for it with the Britons long before the birth of our Saviour.

Q. How is it procured?

A. From the mines in Cornwall.

Q. How is it found there?

A. Chiefly in veins; most frequently in granite, never in limestone.

Q. What is done with it?

A. It is first ground, and then washed to free it from impurities.

Q. Is this all?

A. No; it is roasted and smelted, then poured into square moulds of stone, and is called block tin.

Q. Is it now ready for use?

A. Yes; but before being sent away the arms of the Duke of Cornwall are stamped upon it.

Q. Who is the Duke of Cornwall?

A. The Prince of Wales; and a large

portion of his income arises from the duty paid upon this block tin.

Q. What makes it so useful?

A. Because it is clean, light, and does not rust; looks very bright when well kept, and will wear a long time.

Q. What is lead?

A. It is the most easily melted of all the metals, except tin, and is the softest; it can be bent or cut with a knife.

Q. Can it be rolled out?

A. Yes, and drawn out also; being ductile, though not so much so as gold.

Q. What are its uses?

A. Rolled thin it is employed to cover houses and churches, and for gutters, pipes, cisterns, and reservoirs for water, as it does not rust.

Q. Are there any other uses of lead?

A. Alloyed with arsenic, which renders it hard and brittle, it is used in making shot; mixed with antimony, it is used for printing types, and is sometimes added to tin and copper to form pewter.

Q. Is not lead poisonous?

A. Any acid will extract a poison from it, and on this account it ought not to be used in cooking.

Q. What use is made of the dross which rises to the surface of melted lead?

A. The dross is called calx by the chemist; a name given to what has been reduced by burning to a friable state.

Q. What state is that?

A. One in which it easily crumbles into powder.

Q. Is this always called calx?

A. No; it is now more usual to term the calx of metals their oxydes.

Q. To what uses do we put the oxyde of lead?

A. Red and white lead, so much used in painting, are procured from it; and it is the foundation of many other colours, the dissolving of which in oil often occasions ill health to painters.

Q. Where is lead found?

A. It abounds in England and Wales, particularly in the counties of Derby, Northumberland, Somerset, Cornwall, and Devon; it is also plentiful in Scotland, Ireland, Germany, France, and America.

Q. Has it not lately been brought from Spain?

A. Yes, in great quantities.

Q. Is it ever found pure?

A. It is believed not, but often combined with sulphur, when it is called galen. It is also found mixed with silver.

Q. Has any new process been discovered for the separation of silver from lead ore?

A. Yes; by its means silver may be profitably separated from the lead, when three ounces only of it are found in a ton of ore; formerly, if a ton contained less than six, or even twelve ounces, it was left unanalysed.

Q. Has lead been long known in England?

A. It is supposed some of our mines, which are, perhaps, the most important in the world, were worked by the Romans.

Q. How is it prepared?

A. After having been picked, washed, and roasted, to expel the sulphur, it is mixed with a quantity of coke, and put into the smelting furnace, in which are tap holes, to allow the melted lead to run off into an iron vessel.

Q. What is then done with it?

A. The dross is skimmed off, and the metal taken out by ladles, and poured into cast-iron moulds, with round ends, when it is called pig lead, and is fit for use.

Q. How is iron found?

A. Generally mixed with some other substance, and is then called iron stone.

Q. How are they separated?

A. By intense heat kept up in a furnace, by means of immense bellows.

Q. How are the furnaces formed?

A. They are large round buildings, larger at the bottom than the top, with immense chimneys.

Q. How is the ore put into these furnaces?

A. Lighted fuel is first placed at the bottom, and the ore, broken in pieces, and mixed with limestone, is thrown upon it.

Q. How is the heat made sufficient to melt it?

A. The fuel is blown upon by the bellows, when the iron in the ore just above melts, and more ore and fuel are put in at the top.

Q. How is the melted ore taken out?

A. The iron when melted, being heavier than the other substances mixed with it, falls to the bottom, the workman with an iron rod then displaces the plug at the bottom of the furnace, and the iron runs out like a stream of liquid fire.

Q. What does the metal run into?

A. Into furrows made of sand, where it cools, and is now called cast iron.

Q. What is cast iron used for?

A. For the backs of chimneys, grates, rails for rail-roads, for balconies, and instead of wooden paling before houses, and in gardens.

Q. Are bridges ever made of it?

A. Yes; the Southwark and Vauxhall bridges, across the Thames, and many others are made of cast iron.

Q. Are any parts of houses ever made of it?

A. Yes; the frame work of the roof, and sometimes large beams. Columns are sometimes made of it, and painted to imitate stone.

Q. But how is it made into these forms?

A. Moulds are formed in sand, of the

shape required, the liquid iron is poured into them, and allowed to remain till cold.

Q. What is the quality of this iron?

A. It cannot be hammered, for it has become very hard and brittle, and has lost its tenacity.

Q. Can it be made malleable again?

A. Yes; by a process called blooming.

Q. What is that?

A. It is thrown into a furnace and kept melted for two hours, and being constantly stirred, it acquires consistency and tenacity, and forms a mass.

Q. What is next done?

A. It is taken out of the furnace whilst hot, beaten with a large hammer worked by machinery, and formed into bars; it is then called wrought iron.

Q. What is steel?

A. Iron heated by charcoal and plunged whilst hot into cold water; it thus acquires such extreme hardness it will even scratch glass; and it becomes elastic and brittle, and will take a very high polish.

Q. What is the effect of cooling it slowly?

A. It becomes soft and pliable, and steel will become so if heated again and slowly cooled.

Q. What is steel used for?

A. For all kinds of edged tools in which sharpness is required.

Q. Is it always alike?

A. No; it varies with the degree of heat to which it has been subjected, and these are called *tempers;* the elastic spring of a watch, for instance, requires steel of a much higher temper than would be necessary for a common file.

Q. What is Damask steel?

A. A fine kind of steel from the Levant, used for sword and cutlass blades.

Q. What is Damaskeening?

A. The art of engraving and inlaying iron or steel with gold or silver wire.

Q. Is not the value of iron wonderfully increased by its being manufactured?

A. Wonderfully indeed; a bit of iron not worth a farthing, may be wrought into wire springs for watches, worth three hundred times their weight in standard gold.

Q. Are ornaments made of steel?

A. Yes; many very handsome ones, because of the elegant polish it will take. I have seen mirrors made of it. These are very useful, because they will not break like glass; but they acquire rust so readily, it is difficult to keep them bright.

Q. Does steel easily rust?

A. Very easily; the breath or the air will cause it to do so; this makes it necessary to keep needles, knives, and scissors closely covered, and even that will not do, unless they have been put by perfectly dry.

Q. Is iron useful for any other purpose?

A. Yes; in medicine it is used as a tonic, and water which has passed over iron becomes impregnated with it and is called chalybeate.

Q. What is that word from?

A. A Greek one, chalybs, iron.

Q. Has it not another very valuble property?

A. You mean that of being convertible into a magnet.

Q. I do; how is that done?

A. By being placed in contact with a

natural loadstone it acquires and retains all its qualities.

Q. What is a natural loadstone?

A. An oxyde of iron, which attracts iron, and always turns to the north when hung so that it can move.

Q. To what great use is this wonderful property applied?

A. To enable the seaman to steer across the ocean, and the traveller to direct his course aright over the pathless desert.

Q. How can it accomplish that?

A. By means of a card, on which are printed the points of the compass.

Q. What are they?

A. The four cardinal or principal points are, north, south, east, and west; which are again divided into thirty two.

Q. How does the magnet assist you?

A. There is a magnetized needle so hung, that it can turn round over these points; and as one end of it always settles when towards the north, if you place the card so as to have the word north under that end of the needle, you may at once see in what direction you ought to go.

Q. How can you tell which is the north without a compass?

A. The sun rises in the east, sets in the west, and is in the south at noon; the north would then be directly opposite to it.

Q. How do you know the points on a map?

A. The top is always north, the bottom south, the east to your right hand, and the west to your left.

Q. Where is iron found?

A. All over the earth; but England, France, Sweden, and Russia, are richer in this metal than most other countries of Europe.

Q. Is it ductile?

A. More so than gold; it may be drawn into a wire as fine as the human hair.

Q. Is it heavy?

A. No; it is the lightest of all metals, except tin, being only between seven or eight times as heavy as water.

Q. Is it tenacious?

A. More so than any other metal; a wire one-tenth of an inch in diameter, will support 550lbs. weight without breaking.

Q. Is it elastic?

A. Particularly so when made into steel.

Q. In speaking of lead, how was it you said nothing of that useful article, black lead, of which our pencils are made?

A. Because black lead, plumbago, or graphite, as it is also called, is a compound of iron and carbon, and has no lead in its composition.

Q. Where is it found?

A. In several countries, but especially in Borrowdale, in Cumberland, where there is a mine of it only opened once in seven years, when enough is taken out to serve the kingdom for seven more.

Q. How does it lie in the mine?

A. In separate loose pieces, of a fine grain, and very soft.

Q. What is its appearance when first taken out?

A. It is of a dark iron colour, shines like metal, and is of a thin slaty texture.

Q. What is Britannia metal?

A. It is a kind of pewter, and said to be composed of equal parts of brass, copper, tin, and antimony; but it is supposed to have most tin.

Q. You spoke of bronze; what are its properties?

A. It is very hard, durable, and sonorous.

Q. What is meant by sonorous?

A. Sounding loudly when struck. Bell metal consists of three parts copper, (the most sonorous of all the metals,) and one of tin.

Q. What are its uses?

A. It is made into statues and casts of celebrated antiques. The ancients were so partial to it, that arms and other instruments, medals, and statues, of this metal are found in all cabinets of antiquities.

Q. Is it not now used for cannon ball?

A. Yes; and cannon, also, are made of an alloy of copper and tin.

Q. Were coins always made of the metals now used?

A. No; in very ancient times, stamped leather passed for money; and in 1574, the Hollanders coined great quantities of pasteboard.

Q. Were coins always round?

A. No; iron bars quenched in vinegar, served the Lacedemonians; and the

ancient Britons used plates or rings, made either of iron or tin.

Q. In whose reign were the first gold coins struck?

A. In the reign of Henry III. in 1257, and were called gold pennies.

Q. Why were the gold coins struck in the reign of Charles II., called guineas?

A. Because the gold then used was brought from Guinea, in Africa.

Q. What is lacquering?

A. Lacquer, or lacker, is made by dissolving seed lac, or shell lac, in spirits of wine. To give the golden colour, two parts of gamboge are added to one of annatto, and this solution is applied to brass, tin, and other metals.

Q. What is carbon?

A. The pure or essential part of charcoal; it abounds in vegetables, animals, and even in minerals; the diamond itself is only pure crystalized carbon.

Q. How can that be known?

A. Because when burnt in oxygen gas, the product of combustion is carbonic acid gas.

Q. Who first thought of burning diamonds?

A. Sir Isaac Newton; he supposed from its strongly refractive power, that it was capable of combustion.

Q. But how can it be set on fire?

A. It is heated, and put into a jar containing pure oxygen, when it ignites, or takes fire.

Q. What is oxygen?

A. A gas which generates acids and oxides, and forms the vital part of the common air; being about one-fourth; but is too stimulating for animal life in its unmixed state.

Q. How is it procured unmixed?

A. It can be extracted from many of the substances with which it is combined, by means of heat, and is caught in jars, or bladders, as it rises.

Q. Is not the diamond the most valuable of all the gems?

A. Yes; it is also the hardest, and can only be polished by its own powder.

Q. In what does its particular beauty consist?

A. In its vivid splendour and brightness of reflection. When pure it is perfectly clear and pellucid, like water, from

which I suppose the finest diamonds are said to be of the first water.

Q. Are they always of the same shape and size?

A. No; they are found of various forms and sizes, and sometimes even tinged with various colours, but they all bear the same distinguishing character.

Q. Are they often found large?

A. No; in general they are very small, and incredible prices have been given for the few large ones which have been met with.

Q. Which is the largest diamond known?

A. That belonging to the King of Portugal; it was valued, though uncut, at £224,000,000.

Q. What was its weight?

A. 1,680 carats.

Q. What is a carat?

A. Four grains; diamonds are always weighed by carats.

Q. What is the name of a large diamond recently brought to England, and exhibited at the Crystal Palace in 1851?

A. The Koh-i-Noor, or mountain of light. The English took it from the

Sikhs in the late war; it is valued at £2,000,000.

Q. To whom did it formerly belong?

A. To the Great Mogul.

Q. Where was the Mogul's Empire?

A. In Hindostan, in Asia; it now belongs to England.

Q. Can you tell me of any other very large one?

A. There is one in the sceptre of the Emperor of Russia which weighs 200 carats, and is valued at upwards of £4,000,000; but was bought by the Empress Catherine for £135,000.

Q. Any other?

A. The Pitt diamond, once considered one of the largest, weighed 136 carats, and cost Lewis the XIV. £130,000.

Q. What names are given by jewellers to diamonds?

A. The best are called oriental, because those from the East are considered the finest; the inferior are called occidental, though in the opinion of some, those from Brazil are equal to the finest oriental ones.

Q. In what other way do they distinguish them?

A. According to their figure, by the names of rose diamonds, brilliants, and rough diamonds.

Q. What is the difference?

A. Rose diamonds are quite flat underneath, with their upper part cut in divers little faces, usually triangles, the uppermost of which terminate in a point. Brilliants are those diamonds cut in faces both at top and bottom, and whose principal face or table at top is flat. Rough diamonds are as they are found in the mines.

Q. Are diamonds merely ornamental?

A. No; they are valuable for many purposes: their powder is the best and most economical for the lapidary and gem engraver, and glaziers use them for cutting glass.

Q. How do they hold them?

A. The diamond is set in a steel socket, and fixed to a wooden handle.

Q. Will any pieces do for this work?

A. No; it is very remarkable that a natural crystal must be employed; cut or split diamonds will scratch the glass, but it will not break along the line, as it does when a natural diamond has been used.

Q. Do any other persons work with diamonds?

A. Yes; engravers have lately found them of great value in drawing lines which are to be deepened with aqua fortis.

Q. How were these lines made formerly?

A. By steel points, called etching needles.

Q. What effect has the diamond upon iron when submitted to the action of galvanic heat?

A. It converts it into steel. A diamond being enclosed in a slit of iron wire, and submitted to the above action, the diamond disappeared, and the iron was found changed into steel.

Q. Where are diamonds principally found?

A. In the island of Bornea, and the kingdoms of Visapour, Golconda, Bengal, in the East Indies, and the Brazils, in the West.

Q. What was the diamond called by the ancients?

A. Adamant; and "hard as adamant" is still a common saying.

Q. Where are diamonds discovered?

A. In the principal mine of Raolconda, five miles from Golconda, in the crevices of the rocks in veins of sand, not more than an inch wide, and often not half that width.

Q. How are they got out of these veins?

A. By means of hooks, with which the miners carefully rake out and then wash the sand, and secure the stones.

Q. Where are diamond sparks met with?

A. In the province of Bengal, near Soumelpour; the violent rains bring down these precious gems in the mountain torrents.

Q. How are they collected?

A. When the rains cease, men, women, and children go and search for them amongst the sand.

Q. How do they know when they find one?

A. Chiefly by the touch.

Q. When were diamonds first discovered in Brazil?

A. In 1728.

Q. In what manner?

A. Some negroes, who were condemned to search there for gold, often met with little bright stones, which they threw away; some of them, however, were shewn to the governor.

Q. Did he know them to be diamonds?

A. Yes; he had been in the East Indies, and suspected what they were.

Q. What did he do with them?

A. He sent them to Europe, where they were cut and set, and proved to be of a fine water, though not equal to those of Golconda.

Q. Are not the negroes rewarded if they find a very large diamond?

A. Yes; he who is so fortunate is crowned with flowers, receives his liberty, and a present of new clothes.

Q. Which is considered the most valuable gem next to the diamond?

A. The ruby is the rarest and most esteemed.

Q. What is its colour?

A. The oriental ruby is of a pure carmine, or blood red, and of considerable intensity of colour.

Q. Does it take a high polish?

A. Yes; and then forms a blaze of the most exquisite and unrivalled tint.

Q. Is it as common as the diamond?

A. No; and therefore, when quite pure, is of greater value, and is more highly prized.

Q. Where are rubies found?

A. In Pegu, Ava, Siam, and Ceylon; the king of the former place has the finest ever seen.

Q. What is the amethyst?

A. A precious stone, generally of a violet or purple violet colour. It may be made colourless by putting it into the fire, in which case it nearly resembles the diamond.

Q. Where are amethysts found?

A. In the East and West Indies, and in several parts of Europe.

Q. What is the next gem?

A. The sapphire, of a blue colour, almost as hard as the diamond.

Q. Where is it met with?

A. In Asia; and in Silesia and Bohemia, in Europe.

Q. Which are the most highly prized varieties of the sapphire?

A. The crimson and carmine red, called by jewellers the oriental ruby.

Q. Is there not a particularly beautiful variety of it?

A. Yes; the asterias, or star-stone, of which the colour is generally a reddish violet with an opalescent lustre.

Q. What is meant by opalescent?

A. A coloured shining lustre, reflected from a single spot in the mineral, and is sometimes simple and sometimes radiated.

Q. What is radiated?

A. Sending out rays of light.

Q. Of what colour is the emerald?

A. A beautiful bright green; the emerald ranks next to the sapphire.

Q. Is there anything peculiar about the emerald?

A. It becomes electric by rubbing, and can be fused by the blow-pipe into a whitish enamel, or glass.

Q. Where are emeralds met with?

A. They are found in the mountains of Siberia, but the best come from Peru.

Q. Of what colour is the topaz?

A. Generally of a fine yellow or golden colour.

Q. Which is the most esteemed?

A. The oriental; its colour borders on orange.

Q. Is there not another kind?

A. Yes; the occidental, found in Peru; it is nearly of the same colour, but softer.

Q. Are there any others?

A. Yes; the oriental aqua marina, or blue topaz, and a few more, but of inferior value.

Q. What is the chrysoberyl?

A. It is gem of a yellowish or brownish green colour, sometimes quite transparent, but more frequently only semi-transparent. It is next to sapphire in hardness.

Q. Where does it come from?

A. Principally from South America.

Q. What are garnets?

A. Gems of a crimson colour, found amongst the rocks in Aberdeenshire, in Scotland. The best are brought from Bohemia, where there are mines of them.

Q. What is the carbuncle?

A. A beautiful gem of a deep red or scarlet colour, known to the ancients as the anthrax.

Q. What is the beryl?

A. Beryl, or aqua marina, is a light green variety of the emerald, sometimes straw-colourd, bluish yellow, or even white.

Q. Are they common?

A. Very; the beryl is nearly as hard as the topaz. It becomes electrical by rubbing.

Q. Where are the most beautiful brought from?

A. From Dawna, on the frontiers of China, from Siberia, and from Brazil.

Q. Are they found anywhere else?

A. Yes; in Saxony, and the south of France, and are very common at Baltimore.

Q. Where is that?

A. In North America.

Q. How are they cut?

A. By means of emery, and polished with tripoli.

Q. For what do the Turks esteem them?

A. For the handles of their stilettos, when they are met with large enough.

Q. What is the tourmaline?

A. It is of the emerald family, gene-

rally of a smoky, blackish colour, though sometimes it is green, blue, or brown; when not very thick it is transparent.

Q. Has it not some curious property?

A. Yes; when strongly heated, one of the points of the crystal becomes negatively, the other positively, electric.

Q. How is this quality shewn?

A. It will attract a small quantity of ashes, and then repel them.

Q. Where and when was it found?

A. About the beginning of the last century, by some Dutch merchants, in the isle of Ceylon.

Q. Is there not a fine tourmaline in the British Museum?

A. Yes; a magnificent one, valued at £1000.

Q. What is quartz?

A. A name given to crystallized silica in various degrees of purity. Rock crystal and the amethyst are species of quartz.

Q. Is it often met with?

A. Yes; for it forms a principal part of many mountains, and is very common in our own country.

Q. Is it very hard?

A. Sufficiently so as to scratch iron or steel when rubbed upon them in a powder.

Q. What is the use of it?

A. It is used instead of sand for the finer kinds of glass and porcelain.

Q. What is rock crystal?

A. An extremely beautiful kind of quartz, sometimes quite transparent, and sometimes shaded with grey, yellow, brown, green, or red.

Q. How is it generally found?

A. In the form of prisms, with six sides each, surmounted by six-sided pyramids.

Q. What do you mean by a crystal?

A. An inorganic body which has assumed the form of a regular solid, laminated by a certain number of plane and smooth surfaces.

Q. What is a prism?

A. An oblong solid body, with sides all alike. If the body be triangular, it is called a triangular prism; if square, a quadrangular one.

Q. Where is rock crystal found?

A. Chiefly in the hollow veins of rocks.

Q. Of what use is it?

A. When perfectly transparent, it is employed by opticians to make glasses for spectacles, which are called pebbles, and also for various kinds of optical instruments.

Q. Where does the best crystal come from?

A. From Brazil, in large blocks of from 50lbs. to 100lbs. weight each.

Q. What is its value?

A. From 5*s.* to 20*s.* per lb., according to its quality.

Q. Is crystal ever found in England?

A. Yes; in small pieces, in Cornwall, Somerset, and Wales; and these are called Cornish or Bristol diamonds.

Q. What are Cairn Gourms?

A. Crystals obtained in various parts of Scotland, but particularly in a mountain of that name in the county of Aberdeen.

Q. Are they valuable?

A. When of a deep and good colour they are nearly as much prized as topazes, and if clear and large, are sold at a high price.

Q. What is their usual colour?

A. Smoky yellow or brown.

Q. Is not sand a kind of quartz?

A. It is; and consists of rounded grains with a vitreous or glassy surface.

Q. Are there not hills and plains of sand, in the torrid regions of Africa and Asia, so light, that the wind is continually changing their places?

A. Yes; and this is very dangerous to travellers.

Q. Is sand very useful?

A. Extremely so, in many of our manufactures; there is a kind called founders' sand, which is naturally mixed with clay, and is employed in making moulds to cast metal in.

Q. Is sandstone, or gritstone, really sand?

A. It is formed of particles of sand, consolidated together with great firmness, and is plentiful in England.

Q. Is it much used in buildings?

A. Yes; for the formation of such as are to resist the effects of air, fire, and water.

Q. Is it then very hard?

A. Generally; but sometimes it is soft in the quarry, and becomes hard in the air.

Q. What is flint?

A. A hard close-grained stone, which will split in every direction with a smooth surface, composed almost entirely of the earth called silex.

Q. Where is it found?

A. It is very common in England, particularly in Norfolk, and in those parts where the chalk stratum is found.

Q. What are agates?

A. Semi or half-transparent stones of the quartz kind, which are capable of taking a high polish.

Q. What colour are they?

A. Nearly of every colour, except bright red and green.

Q. From what do they take their name?

A. From the river Achates, in Sicily, where these stones were found in great abundance by the ancients.

Q. Are they now met with in any other places?

A. Yes; in several parts of Europe, but particularly in Iceland, Scotland, Hungary, and Saxony.

Q. Where is Iceland?

A. It is an island to the west of Norway, 260 miles long, and 180 broad.

Q. Is it very cold there?

A. Yes; it takes its name from that circumstance; but there is a noted volcano, or burning mountain there, called Mount Hecla, and several hot springs, called Geysers.

Q. Where is Tuscany?

A. It is a duchy of Italy, belonging to the kingdom of Austria.

Q. What are agates chiefly used for?

A. For ornamental work; such as seals and necklaces; but they are sometimes made into cups, knife handles, snuff boxes, and other articles.

Q. What is cornelian?

A. Another kind of agate, of a red or flesh colour, though sometimes white, orange, and yellow.

Q. Where does the best come from?

A. From the East Indies, and is much used for seals, beads, and other trinkets.

Q. What is the onyx?

A. A species of agate, marked alternately with white and black, or white and brown.

Q. What are opals?

A. Semi-transparent stones, of a milky cast, which exhibit a changeable colour, when held between the eye and the light.

Q. Where are they found?

A. In Sumatra and several parts of the East Indies; there are also quarries of them in Hungary.

Q. Are there many varieties of the opal?

A. Yes; the chief are the *noble opal*, which exhibits brilliant and changeable reflections of green, blue, yellow, and red; the *fire opal*, which simply affords a red reflection; and the *common opal*, whose colours are white, green, yellow, and red, but without the play of colours; the *semi-opal*, which is not so transparent as the common opal; and the *wood-opal*, which appears in the shape of trunks, branches, and roots of trees.

Q. What is the chrysopras?

A. An extremely hard stone, of a clear apple green colour, semi-transparent; it is a quartz.

Q. What is jasper?

A. A species of quartz, and one of

the hardest stones with which we are acquainted.

Q. What is its colour?

A. It varies, being sometimes red, green, yellow, blue, olive, violet, black, and often variegated, spotted, or veined with several colours.

Q. Where is jasper found?

A. In Spain, Germany, and Hungary.

Q. What is the bloodstone, or heliotrope?

A. A stone of a dark green colour with a bluish cast, and marked with dark blood-red spots or stripes.

Q. Where does it come from?

A. From Bucharia, Persia, Siberia, Ireland, and Germany.

Q. What is lapis lazuli, or lazulite?

A. A mineral of azure blue, of which the paint called *ultra marine* is made. It is very compact and hard, and is found in lumps of a beautiful blue colour, richly variegated with clouds of white, and veins of shining gold colour.

Q. Where is it found?

A. In Persia, Natolia, and China, also in Siberia and Tartary.

Q. Has it been met with in Europe?

A. Only in Germany and amongst the ruins of Rome.

Q. What is pyrites?

A. A mineral formed by a combination of iron with sulphur, also called bisulphuret of iron.

Q. Why is it so called?

A. Because it is a compound of 2 parts of sulphur with 1 of iron.

Q. Is it often met with?

A. Yes; martial pyrites are often found mixed with coal. This species of coal, when in contact with water, is apt to be decomposed and to burn spontaneously, and is supposed to have caused the destruction, by fire, of ships at sea.

Q. Has it not been found in the tombs of the Incas of Peru?

A. Yes; it appears to have been polished, and used as mirrors.

Q. What is felspar?

A. A very common stone, taking its name from the German; meaning, spar of the fields: it is one of the constituents of granite, and forms a principal part of many of the highest mountains in the world.

Q. Does it keep its hardness?

A. No; when exposed to the weather, it gradually acquires an earthy appearance, and passes into procelain clay, so much used in the manufacture of the finer kinds of earthenware.

Q. Are there not different kinds of felspar?

A. Yes; Labrador felspar is very beautiful; but the most durable is moonstone, or adularia, which takes its name from a silvery play of colour, not unlike the moon.

Q. Where is it found?

A. On some parts of Mount St. Gothard; also, in Switzerland: but the finest comes from Ceylon.

Q. Where is common or potter's clay found?

A. In almost every country in the world.

Q. Will you tell me some of its uses?

A. Mixed with sand, it is formed into bricks, tiles, and coarse earthenware.

Q. How are the latter glazed?

A. Either with lead, or by throwing a certain portion of salt into the furnace.

Q. How are the finer sorts of earthenware formed?

A. The clay is made into a paste with water, and then moulded into the shape required upon an horizontal wheel, the potter forming the inside with one hand, and the outside with the other, as the wheel turns round.

Q. Are these glazed in the same manner as the coarser kinds?

A. No; when they have been once baked they are dipped into a glazing matter, consisting of white lead, ground flints, and water, and are then baked again.

Q. How are the different colours given to earthenware?

A. By means of the oxydes of different metals.

Q. What is the difference between earthenware and porcelain?

A. That the former is opaque, and the latter semi-transparent.

Q. Where was the first manufacture of porcelain supposed to have been made?

A. In China and Japan. It is said, that in a single province in China nearly a million of persons were at one time employed in this manufacture.

Q. Is there not a beautiful kind of porcelain made in France?

A. Yes, at Sevre; and there are well-known manufactories of it in Meissen, Saxony, at Berlin, and in Austria.

Q. Are we obliged to send to these places for our china?

A. No; none are at present superior to our own in Worcestershire and Staffordshire.

Q. What is china called before it is baked?

A. Biscuit; in that state it receives the glazing; it is then baked again, then painted, and baked a fourth time.

Q. How is china made in Worcestershire?

A. The materials are ground with an iron roller of immense weight, then calcined, and ground again at a water-mill.

Q. What is done with it then?

A. It is dried to the consistency of clay on the slip kiln, then taken to the throwing room, formed into cups, &c., and carried to the store room.

Q. What is done with it there?

A. It dries gradually till ready for turning and pressing.

Q. What is done by pressing?

A. The articles are diminished to about one-half of their original thickness, and then they are put into the biscuit kiln and burnt sixty hours.

Q. How is stoneware made?

A. Of pipe-clay, mixed with flints calcined and ground.

Q. What is Wedgewood's queen's ware made of?

A. Pipe-clay much beaten in water till the coarser parts sink to the bottom.

Q. How came ground flints to be used in the potteries?

A. About the year 1720, a potter, travelling to London on horseback, found something the matter with his horse's eyes, and when at Dunstable, he asked the hostler to attend to them.

Q. What did he do?

A. He burnt a flint, reduced it to powder, and blew it into the horse's eyes.

Q. But what could make the potter think of using it in making porcelain?

A. He observed the beautiful white colour the flint took after having been calcined, and instantly thought of the

use to which it might be applied in his own manufacture.

Q. What is pipe-clay?

A. Clay of a very plastic nature, and of a yellowish white colour.

Q. What makes it so white in the pipes?

A. Merely burning.

Q. How is it formed into tobacco pipes?

A. By the simple process of casting it in moulds and forming a hole through the stem by means of a wire, dipping the ends in some glazing mixture, and then baking them.

Q. Is pipe-clay of any other use?

A. Yes; it is formed into oblong pieces, dried, and employed in cleaning woollen cloths, and for various domestic purposes.

Q. What is tripoli?

A. A kind of clay of a yellowish grey, brown, or white colour, and sometimes striped or spotted; when examined with the microscope it is found to consist almost entirely of minute flinty shells.

Q. From what does it take its name?

A. From having been first imported

from Tripoli, on the northern coast of Africa.

Q. Is it found anywhere else?

A. Yes; in Germany: and a granulated kind has been discovered in England.

Q. How is it employed?

A. Lapidaries and other artists use it to polish precious stones, metals, and glasses for optical instruments.

Q. What makes it so useful for these purposes?

A. Because the particles are so fine they do not leave any scratch which can be perceived.

Q. What is rotten stone?

A. A kind of tripoli, found in Derbyshire and Staffordshire: it is composed of infusorial remains, and used for most of the same purposes.

Q. What is clay slate, or roofing slate?

A. A kind of stone of a greyish blue colour, which can be broken into splinters.

Q. How is it found?

A. In vast strata, or beds, in different parts of the world.

Q. Have we any in our country?

A. Yes; in Westmoreland, Yorkshire, North Wales, and other parts.

Q. How is it brought out of the quarries?

A. At first it is so soft as to be easily cut or split.

Q. What are its uses?

A. It is used as slates for writing upon, whetstones, and for roofing houses.

Q. How is it proved to be fit for these latter purposes?

A. As soon as it is taken out of the quarry it is weighed, then laid in water for some days, then well dried and weighed again.

Q. What is known from this?

A. If it be found to have increased in weight, it is laid aside, as being porous, and unfit for roofing.

Q. What is porous?

A. Admitting the water to soak through it, by means of little holes called pores, such as are in the sponge.

Q. How are those that will answer formed for the purpose.

A. The slate is split into plates, and a hole made through them at one end.

Q. Why is that done?

A. That a peg may be driven through to fasten the slate to the rafter.

Q. What are rafters?

A. Narrow strips of wood laid along from beam to beam, to form and support the roof.

Q. How is the rain prevented from getting between the slates?

A. They are made to fold over each other up to the top, in the manner of the scales of a fish.

Q. Which is the best slate for writing upon?

A. That which is dark, compact, and solid.

Q. How is it prepared for this purpose?

A. It is made smooth by an iron instrument, then ground with sandstone, and slightly polished.

Q. What is done with the softer and more friable pieces?

A. They are used as slate pencils.

Q. What is black chalk, or drawing slate?

A. A kind of ochreous earth of a close structure and fine black colour.

Q. What is red chalk?

A. An indurated clayey ochre used by painters and artificers.

Q. What is indurated?

A. Hardened.

Q. What is ochre?

A. A species of earth composed of fine, soft, smooth, coherent particles, of various colours; yellow being the most prevalent.

Q. Where does the best come from?

A. Italy.

Q. What is hone, or whetstone?

A. A stone of a slaty texture, and generally of a dull white, or greyish green, consisting of the remains of invisible animalcules.

Q. How does it feel?

A. Smooth and unctuous, that is, oily.

Q. What is its use?

A. When properly cut and smoothed it is indispensable to carpenters, cutlers, and other workmen, for sharpening their instruments.

Q. What are whetstones of the finest grain kept for?

A. To sharpen lancets, razors, and penknives.

Q. Are they not sometimes called Turkey stones?

A. Yes; because they were originally brought from Turkey and the Levant.

Q. Where is the Levant?

A. It is the most eastern part of the Mediterranean.

Q. Where are they now found?

A. In Saxony and Bohemia, in North Wales, and near Drogheda, in Ireland.

Q. Is there not a vulgar error in regard to them?

A. Yes; that they are hollywood converted into stone by lying in petrifying water.

Q. What is petrifying water?

A. Water which by means of the fixed air or carbonic acid gas it contains, holds a portion of lime dissolved in it: but this gas escaping when the water comes into the outer air, the lime is precipitated, that is, falls down.

Q. Is there any well in England, famous for its petrifying qualities?

A. Yes; that which is called the dropping well at Knaresborough.

Q. Was it not once thought that petri-

fied substances were the things themselves changed into stone?

A. It was, but that is quite a mistake: the lime rests upon, and keeps penetrating the pores of whatever it falls on, and if that object decays, it supplies its place, thus keeping the same form, though enlarged.

Q. What is mica?

A. Mica, glimmer, or muscovy glass, is a mineral substance of a foliated texture, capable of being split into leaves.

Q. Are these leaves very thin?

A. Extremely so; they are perfectly transparent and very elastic.

Q. What is the colour of mica?

A. Greenish, sometimes nearly black, reddish brown, yellow, or silvery white, and sometimes it has a metallic lustre on the surface.

Q. Is it soft?

A. Yes; it can easily be scratched, and when divided across, the plates seem rather to tear than break.

Q. What is mica used for?

A. In Siberia and Muscovy it supplies the place of glass for windows, and in the Russian shipping it is preferred to

glass because the shock occasioned by firing the guns does not shatter it.

Q. Where does the mica come from which is used for this purpose?

A. From several parts of Siberia, on the shores of the Caspian, on the borders of the lake Jenesey, in Georgia, &c.

Q. Might it not be used for lanterns instead of horn?

A. Yes; with great advantage; as it is more transparent, and the flame of a candle does not injure it.

Q. Where is it very plentiful?

A. In Bengal; but after long exposure to the air, it becomes dirty and loses its transparency.

Q. What is basalt?

A. A coarse-grained stone, found in round distinct pieces, and in groups of large columns, each of which has from three to eight sides, is divided horizontally into numerous stones, which fit very exactly into each other.

Q. Are there not some very remarkable assemblages of these groups?

A. Yes; those called the Giant's Causeway, on the coast of Antrim, in Ireland, and the cave of Fingal, in the

island of Staffa, one of the western isles of Scotland.

Q. Do not these stones impart a peculiar property to mortar?

A. Yes; when burnt, pulverized, and mixed with it, they cause it to harden under water.

Q. Can it be melted?

A. Easily, and without any addition, into an opaque and black glass.

Q. Is there anything peculiar in this glass?

A. Olive green bottles can be made from it of extreme lightness, yet of great strength and solidity.

Q. Have not statues been made of basalt?

A. Yes; the ancients prized it much for that purpose, on account of its great durability.

Q. Are the columns of it sometimes very large?

A. Yes; Pliny states that several figures have been made from one.

Q. What is bole?

A. An earthy mineral, which has an internal glimmering lustre.

Q. What happens when it is put into water?

A. It immediately absorbs the water, and breaks down into small pieces, with a crackling noise.

Q. Was it not formerly valued as a medicine?

A. Yes; it was made up into little cakes and stamped with certain impressions, from which circumstance they received the name of sealed earths.

Q. For what is it now used?

A. It is used for tooth-powder and a course kind of paint.

Q. What is meerchaum, or sea-froth?

A. A fine sort of clay, which when fresh dug is soft, and makes a lather like soap.

Q. What is its chief use?

A. To form the bowls of tobacco-pipes used by the Turks.

Q. Where is it found?

A. In a fissure, or crack, of grey calcareous earth, in Asia Minor, Spain, Greece, and Moravia.

Q. What is fuller's earth?

A. A soft friable clay, unctuous to

the touch and remarkable for its property of absorbing oil.

Q. For what is it used?

A. For taking grease out of woollen and other cloths, by means of a machine called a fulling-mill, from whence its name is taken.

Q. Where is it found?

A. No country produces better than England; but in Bedfordshire a peculiarly fine sort is dug from pits ten or twelve feet under ground.

Q. What is talc?

A. Mica and talc are much alike, but the plates of the former are more elastic.

Q. What is French chalk?

A. An earthy talc, nearly allied to the common. It combines with grease, and is useful in drawing.

Q. What is asbestos?

A. A greenish, or silvery white mineral, of fibrous texture.

Q. Where is it found?

A. In Corsica, Elba, Sweden, Cornwall, Anglesea, and Scotland.

Q. From what is its name derived?

A. From a Greek word, signifying inconsumable.

Q. For what purpose was it used by the ancients?

A. To make an incombustible kind of cloth, in which they wrapped the bodies of their dead before they burnt them.

Q. Why did they do this?

A. That they might be enabled to collect their ashes without their being mixed with those of the wood.

Q. What is it like?

A. It is very coarsely spun, but as pliable and soft as silk, and when set on fire will burn with great rapidity and brightness without at the same time being consumed.

Q. What do the Chinese form of this mineral?

A. Furnaces; they grind it and mix it with a kind of mucilage, Gum tragacanth is said to answer for that purpose.

Q. Will no heat destroy it?

A. Yes; it may, by a very strong fire, be melted into a dense kind of scoria.

Q. What is that?

A. The drossy, vitreous, or glassy mass, to which the ores of metals are reduced by fusion.

Q. What is lime?

A. A mineral of a whitish colour, and pungent, acrid, and caustic taste.

Q. Is it ever found pure?

A. Seldom or never; because it always attracts carbonic acid and water.

Q. What are those earths called, of which lime forms a principal part?

A. Calcareous, from the Latin word, calx, lime.

Q. Is there much of this mineral?

A. It has been calculated that one-eighth of the outer part of the earth is lime.

Q. What are the most interesting combinations which it makes?

A. Combined with carbonic acid, it forms common limestone, chalk, marble, &c.: with sulphuric acid, it constitutes gypsum, or alabaster; and with fluoric acid, Derbyshire spar.

Q. Is it found in any other substance?

A. Yes; in shells, bones, and the hard coverings of insects: human bones contain eight parts in ten of lime, and the shells of birds' eggs nine in ten.

Q. How is pure lime procured?

A. Alternate layers of calcareous

earth and fuel are arranged in a kiln, and a fire being kindled, the carbonic acid and water become volatilised, and fly off, leaving the pure lime.

Q. What is it called in this state?

A. Quick lime, and it will now corrode and destroy animal matter.

Q. Can you tell me some of the uses of quick lime?

A. It is employed by the farmers as a manure; also by bleachers, tanners, sugar-bakers, soap-boilers, ironmasters, chemists, in several manufactories and in medicine.

Q. What are Portland, Bath, and Kitton stone?

A. Different varieties of carbonate of lime, so hard and compact as to be used in building.

Q. How did they obtain their names?

A. From the places where they are found; at Portland island, near Bath, and near Kitton, in Rutland.

Q. Is there anything remarkable in Kitton stone?

A. Yes; it is so like the roe of a fish, as sometimes to be called roe-stone or oolite.

Q. Where is Portland?

A. Near Weymouth, in Dorsetshire?

Q. What places are built of Portland stone?

A. The bridges and most of the principal buildings in London, which are of a late date.

Q. What is granite?

A. A primary rock, composed of particles of quartz, felspar, and mica.

Q. Where is it found?

A. In most countries; it is the foundation rock of the earth. It forms the lofty Grampian hills in Scotland: the Logan, or rocking stones of Cornwall, are formed of it. The Alps, Pyrenees, and Carpathian mountains are of this rock. In Asia, granite forms a considerable part of the Uralian and Attaic mountains, and it appears to compose the principal mountains that have been examined in Africa.

Q. For what is it used?

A. For bridges, mill-stones, troughs, and steps. The streets of London are paved with it, and it is employed in architecture, being very valuable on acount of its great hardness and durability.

Q. What is marl?

A. A mixture of carbonate of lime and clay, and is an excellent manure for light lands.

Q. How may it be known?

A. By breaking a piece into vinegar, when it will immediately dissolve with considerable effervescence, particularly when there is much lime in it.

Q. Are there not fossils of various kinds often found in it?

A. Yes; in Ireland the workmen frequently meet with the horns of deer and other fossil remains.

Q. What do you mean by fossils?

A. Any substance dug out of the ground which is penetrated by earthy or metallic particles, so as to be, as it were, changed into that material, without losing its shape.

Q. What is Florence marble?

A. A kind of marble never used in architecture, but often cut and framed as pictures; frequently having, when held at a distance, the appearance of a drawing in bistre.

Q. What are Epsom salts?

A. Sulphate of magnesia; a bitter

and unpleasant salt, manufactured in great abundance from sea water, though sometimes from the mineral waters of Epsom, in Surrey, and Seidlitz, in Bohemia.

Q. What is magnesia?

A. A soft, white, light earth, with little taste or smell, and insoluble in water. It is generally procured from sulphate of magnesia, and is a component part of many minerals.

Q. What are its uses?

A. It has important uses in medicine; it is also employed in some chemical processes, and by the manufacturers of enamels and porcelain. Calcined or pure magnesia is the most effectual antidote in cases of poisoning by the mineral acids or by oxalic acid.

Q. Is not magnesia useful for purifying water?

A. Yes; if a small quantity be stirred into tainted water, it will lose much of its bad taste and smell.

Q. What is potash?

A. An alkali procured by burning vegetable substances; it is used in many arts and manufactures, in scouring, bleaching, dyeing, glass-making, &c.

Q. What is pearlash?

A. Refined potash.

Q. What are alkalies?

A. Bodies which have a peculiar acrid taste: they change the blue juices of vegetable to a green, and the yellow to a brown: and have the property of rendering oils mixable with water.

Q. What is phosphorus?

A. A combustible substance, resembling bees' wax in colour and consistency.

Q. What are its properties?

A. It is luminous in the dark, and has a smell something like garlic: if anything is written with it in the dark, the words will appear like moving fire of a pale bluish colour.

Q. If any of it got under the nails, or penetrated the skin, would it be dangerous?

A. Yes; it would cause sores very difficult to heal; it ought, therefore, to be used with great caution, and frequently dipped in water, to prevent its taking fire by friction whilst writing.

Q. How ought it to be kept?

A. In water, and in the dark.

Q. How is it obtained?

A. The greater part of what is sold in the shops is obtained from burnt bones.

Q. Is there anything that has this phosphoric appearance?

A. Yes; the back shell of a lobster, if kept for a day or two, will shew this light, and so, at times, will the decayed roots of trees.

Q. What is common salt?

A. Common salt, or, according to its chemical name, muriate of soda, is one of the most useful articles we possess.

Q. How is it found?

A. In a solid state, in some countries; but is mostly a preparation from sea water, or the waters of salt lakes, or brine pits.

Q. What is it called in that solid state?

A. Rock salt.

Q. Where are the most celebrated salt mines?

A. Near Cracow, in Poland.

Q. Do these contain much salt?

A. It is supposed there is enough in them to supply the world for several thousand years.

Q. By whom are they worked?

A. By people who scarcely ever see daylight, and who form a kind of republic, being governed by stated laws and rules.

Q. How is the salt taken out?

A. In blocks, sometimes of nine feet long, four wide, and two thick.

Q. Is there anything curious in these mines?

A. There is; those who visit them are let down a shaft 150 feet by a rope.

Q. Where does that take them to?

A. To what is called the first floor, an excavation about 100 feet long, 80 broad, and 20 high, besides the stable; from thence a long gallery leads to the interior of the mine, with smaller passages, branching off in various directions, each named after some Austrian prince or princess.

Q. Is there anything below this?

A. Yes; a flight of steps takes the visitor down 100 feet lower to the second floor.

Q. Do any people work here?

A. Yes; here they hew out pillars of

salt, which they cut into masses for home use, or pack in barrels for exportation.

Q. What is exporting?

A. Sending anything abroad out of our own ports or harbours; while importing is bringing anything into them.

Q. Have you now mentioned the lowest part of the mine?

A. No; from thence you would proceed till you came to a platform, from whence you would look upon an abyss which displays a stupendous cavern, having the appearance of a castle in ruins.

Q. What else is there here?

A. There are some rows of seats at the bottom, rising like the benches of a theatre, and opposite to them is an orchestra.

Q. Is this ever used?

A. Yes; upon great occasions a small band plays a few simple airs, which have a most singular effect.

Q. Is there anything else in this part?

A. Yes; long galleries and flights of steps, wide enough to admit currents of fresh air, lead deeper and deeper.

Q. Are there men working here?

A. Yes; in some parts are caverns full of busy workmen: in the galleries they are wheeling their little carts, full of salt, each with its little lamp fixed in front.

Q. Is there still another floor?

A. Yes, called the fourth; and in this is a little lake, about 80 feet broad, and 40 wide.

Q. What kind of salt is here?

A. Green salt, the most common and easiest cut.

Q. What is then found?

A. Spica salt, of a harder and closer grain; and then comes a still finer variety.

Q. How deep is this part of the mine?

A. About 700 feet below the surface of the earth: the finest crystal salt lies 300 feet lower than this, and is reached by long flights of stairs.

Q. Are there any other remarkable things in this mine?

A. Yes; on the first floor is a chapel, presenting an altar, a statue of the Virgin Mary, and many other figures, cut out of the solid salt.

Q. How is salt obtained from sea-water and brine-pits?

A. The water is admitted into shallow trenches, and, being exposed to the heat of the sun, or of fire, it evaporates, and the salt is left in a crystalline state.

Q. What is the difference between snow and hail?

A. Snow is vapour frozen in the middle regions of the air at the instant it is formed; hail is water more intensely frozen, after it is formed into drops.

Q. What is coal?

A. A fossil production of vegetable origin, divided by mineralogists into three species.

Q. How is it known to be of vegetable origin?

A. Because carbon, the chief part of all vegetable matter, composes three-fourths of coal; and it is also found in various stages of fossilization.

Q. What do you mean?

A. That it is sometimes found of a fibrous texture, and ligneous appearance.

Q. What is meant by ligneous?

A. Woody; and even the knots of the wood may be seen in the same places which produce specimens of perfect mineral coal.

Q. Where was any found which shews this?

A. At Bovey, near Exeter; and impressions of leaves and stems on coal have been found in the pits of Cumberland and Westmoreland.

Q. Has anything of this kind ever been met with elsewhere?

A. Yes, in Ireland; where a standing forest has been discovered 100 feet below the soil.

Q. Is not its burning so readily another reason for supposing it to be formed from vegetables?

A. Yes; for there is scarcely any mineral which is combustible.

Q. Has not peat been converted into a substance greatly resembling coal?

A. Yes; a machine has lately been invented which effects this by simple pressure.

Q. What are the people called who work in the coal-pits?

A. Colliers; so are the ships which carry the coals away.

Q. Where are the most extraordinary coal-pits in the world?

A. At Whitehaven, in Cumberland:

they extend under the sea even where the water is deep enough to allow of ships sailing over them.

Q. How are the tops of these coal-pits protected against the sea breaking in?

A. The miners, as they work, leave pillars of the coal, which are whitewashed, to shew they must not be cut any thinner.

Q. Are the coals always together?

A. No; they are generally found lying in strata, as they are called, apart from each other.

Q. How do the miners go down to their work?

A. There is generally a long sloping passage, which leads to the bottom of the mine, upon and down which the horses are taken; but men and coals are usually drawn up and down through the shaft.

Q. What is that?

A. A large opening, which goes directly down to where the miners are at work.

Q. Are there not many dangers in working these pits?

A. Yes; the greatest of which arises

from fire-damp, as it is called; that is, carburetted hydrogen gas, or inflammable air, produced in the mine, and which, when mixed with atmospheric air, explodes with great violence, if it meet with any lighted substance.

Q. How is this danger avoided?

A. By the use of a lamp invented by Sir Humphry Davy.

Q. What is its construction?

A. Simply a fine gauze, through which flame will not pass.

Q. Is there any other dangerous gas met with in these pits?

A. Yes; that of carbonic acid, or fixed air, which, being heavier than the common air, lies at the bottom of the mine, and occasions death by suffocation.

Q. What causes this terrible gas?

A. A union of carbon with oxygen, caused by fermentation: it is this that makes small heated rooms so unhealthy, and which so often causes death to those who go down into pits or wells, which have not been properly ventilated.

Q. But if this gas be heavier than the air we breathe, how can it be removed?

A. There is a beautiful arrangement of the Creator, by which, though this gas is originally formed at the bottom of wells, or other confined situations, and would remain there if undisturbed, yet, if once it be agitated and mixed with the atmosphere, it cannot sink again.

Q. How is the presence of this gas discovered?

A. Air, which will not sustain life, will not allow a candle to burn; and a lighted taper let down into a well, where there is a quantity of this gas, is directly extinguished.

Q. How is it expelled?

A. The best method is to dash water against the sides of the well; this disturbs the gas, and the atmospheric air mixes with it, in which a lighted taper will burn clearly.

Q. How is that kind of gas made with which our streets are lighted?

A. From coal: but it can also be made from oil.

Q. What is coal called when this gas has been extracted from it?

A. Coke: this is used where intense heat is required without smoke.

Q. When was gas first evolved from coal?

A. In 1739, by Dr. Clayton.

Q. When was it first applied to the purposes of illumination?

A. In 1792, by Mr. Murdoch, in Cornwall: in 1802, Bolton and Watt's foundry, at Birmingham, exhibited the first display of gas-lights, during the rejoicings for peace.

Q. What street was first lighted with gas in London?

A. Pall-Mall, in 1809: and, in 1814, it had become general throughout the metropolis. The gas-pipes in and around London are now said to be more than 1,100 miles in length.

Q. Have any instances occurred in which portions of a country have been lighted naturally by gas?

A. Yes; there is a province in China, which has been lighted by gas, issuing from *No-tsing*, as they are there called, for several thousand years; the same phenomenon has also been exhibited at Fredonea, on the shores of Lake Erie.

Q. Are there not many kinds of coal?

A. Yes. That called cannel coal takes

fire most readily, burns with the most cheerful blaze, and does not soil the fingers; but soon burns away.

Q. What is peat?

A. A combination of vegetable matter, consisting of leaves, stringy fibres, and the remains of aquatic mosses.

Q. Where is it found?

A. In extensive beds, called peat mosses, in Wales, Scotland, and many parts of England.

Q. What is jet?

A. A solid, black, opaque, inflammable fossil, harder than asphalt, and susceptible of a good polish.

Q. Where is it found?

A. In Scotland, Whitby in Yorkshire, Bavaria, and in France, near the Pyrenees.

Q. What is bitumen?

A. A combustible mineral, greasy to the touch, and giving out a strong smell in burning.

Q. Is it found in various states?

A. Yes; as a fluid, when it is called naphtha; when viscid, petroleum.

Q. What are the uses of naphtha?

A. It is burnt in lamps, and sometimes put into varnish.

Q. Is it ever found in England?

A. Yes; at Pitchford, in Shropshire, extensive beds of sandstone are saturated with it, from which it is obtained by distillation, and sold as a remedy for sprains and rheumatism, under the name of Betton's British Oil.

Q. What is asphalt?

A. A bituminous or inflammable substance, found in abundance in different countries; but no where in such quantities as in the island of Trinidad, where there is a large lake, called the Pitch Lake, three miles in circumference.

Q. What is amber?

A. A transparent combustible substance dug out of the earth, or found upon the sea coast, having been extracted from its native strata by the action of the waves. Sir David Brewster, after repeated experiments, has come to the conclusion, that it is an indurated vegetable juice; it manifests electricity by friction, being the first substance in which that property was observed.

Q. What is antimony?

A. A brilliant, brittle metal, of a silvery white colour: it has not much

tenacity, and is so brittle that it may be powdered.

Q. Where is it found pure?

A. In the state of Connecticut, in North America, lying in the ground in masses.

Q. Where is that found which is principally used in Europe?

A. In Norway and Germany. Scarcely a ton a year of antimony is raised in England. The ore is purified by exposure to a strong heat in a peculiar kind of furnace.

Q. Is it thought that the ancients were acquainted with antimony?

A. Yes: it was used by females for staining the eye-lashes. It is used, in combination with other metals, in making printers' types, and specula for telescopes. Its oxides are employed in medicine, and in colouring glass.

Q. Were there many false ideas of antimony in the middle ages?

A. Yes; it was through this that alchymists hoped to find the philosopher's stone, which was to turn all metals into gold, and make people live for ever!

Q. Did any real good result from these experiments?

A. Yes; many of its truly valuable properties as a medicine were discovered by them.

Q. What are some of the medical properties of antimony?

A. Prepared with sherry wine, it is called antimonial wine, and given as an emetic; but, if mixed with milk, it loses this property, and becomes a narcotic.

Q. What is that?

A. Something which makes people sleep?

Q. What is bismuth?

A. A metal of a reddish white colour: it is generally found with cobalt, in the cobaltic ores of Saxony and England.

Q. What is water?

A. A compound, consisting of hydrogen and oxygen.

Q. Are the hydrogen and oxygen in equal proportions?

A. No; there are exactly eight parts, by weight, of oxygen, to one of hydrogen.

Q. In how many states do we find water?

A. In four: solid, or ice; liquid, or water; vapour, or steam; and in a state of combination with other bodies.

Q. Is all water alike?

A. No; there is a very great difference in respect to the purity, and hardness or softness, of water.

Q. Which is considered the purest?

A. Rain water, from having undergone a kind of natural distillation.

Q. Does rain water appear pure in towns?

A. No; because it contracts impurities from the smoke, and even from the mortar and plaster of the houses.

Q. Are ice and snow water equal in purity to rain?

A. Yes; and the air having been expelled from them whilst freezing, they do not contain any when freshly melted.

Q. What is the cause of that happy effect, of ice rising to the top of the water in freezing, instead of sinking to the bottom?

A. Every little drop crystallizes, and takes up more room, spreading itself out, leaving a little space between each crystal, and thus becoming lighter.

Q. Is it this expansion which causes pipes and bottles to burst in frost?

A. It is.

Q. What is spring water?

A. Nothing more than rain water gradually filtered through the earth, collecting at the foot of hills, &c., and from thence rising to the surface.

Q. Are these springs of different kinds?

A. Yes; according to the kind of soil through which they pass. Almost all spring water becomes hard by mixing with earthy salts, and this makes it unfit for washing, as it curdles soap, instead of dissolving it; and it cannot be used for cooking some sorts of food.

Q. Is not river water softer than spring?

A. It is; but not so pleasant for drinking.

Q. Is there not something peculiar in the Thames water?

A. There is; and sailors prefer it to most other water for sea-store.

Q. But is it not very unpleasant, after it has been in the casks a month or two?

A. Yes; but if poured into earthen jars, and exposed to the air, it becomes perfectly clear, sweet, and fit for use.

Q. What is stagnant water?

A. Water which stands without being agitated by springs or currents; it is very unwholesome to live near, from the noxious vapours which arise from it.

Q. What is sea water composed of?

A. A variety of substances, principally of saline or salt particles: but it also contains minute portions of animal and vegetable matter, from the gradual decay of which its peculiarly nauseous and bitter taste is owing.

Q. Is it not said, that the sea water is the saltest where there is the most animal and vegetable matter to be disolved in it?

A. It is so; and the waters of the Baltic are not so salt as those of the Atlantic.

Q. What are mineral waters?

A. Waters that have passed through different earths, and thus acquired their different tastes and properties.

Q. Is it most free from taste when it has only passed through rocks?

A. It is.

Q. Is water always cold when it comes out of the earth?

A. No; the temperature varies: there are hot springs in various parts of the

world, the most remarkable are the Geysers in Iceland.

Q. How high does the water in the Great Geyser rise?

A. To the height of 100 or 200 feet.

Q. Are there not different kinds of rocks?

A. There are, primitive rocks, secondary rocks, alluvial depositions, and volcanic rocks.

Q. What are primitive rocks?

A. They are considered to belong to the oldest, and first-formed parts of the world, because they never contain any vestige of animal or organic remains.

Q. What are organic remains?

A. Organized bodies are all those which have any organs, from the Greek word, organon, an instrument; thus the eye is an organ, or instrument, by means of which we can see.

Q. But what organs can plants have?

A. The sap vessels of a plant are the organs by means of which nourishment is conveyed to the different parts.

Q. What are secondary rocks?

A. Those stratified rocks, older than the tertiary and newer than the primitive,

which contain distinct organic remains: there are several groups or systems, amongst which is the carboniferous, containing the coal measures.

Q. Is there anything remarkable in the fossils of the secondary rocks?

A. Some of them contain the earliest indication of the existence of reptiles, termed Saurians, some of which were of immense size.

Q. What are volcanic rocks?

A. Rocks supposed to be the production of volcanoes, or burning mountains.

Q. What is pumice stone?

A. It is also supposed to be of volcanic origin.

Q. Is it a useful mineral?

A. Very much so, for smoothing the surface of wood, leather, metals, stones, and other substances.

Q. What is lava?

A. The melted compound of minerals and other matter, which flows from burning volcanoes.

Q. Are any of the plants which grow on the rocks and sea-shores, — sea weeds, as they are called, of any value?

A. Yes; many of them are highly so, being very useful.

Q. Will you tell me some of their most important uses?

A. To make kelp was at one time the most so of all, not less than 20,000 tons of this article being annually made in Scotland, and the islands around it.

Q. How is it made?

A. By drying the bladder fucus, (a flat-shaped weed, with air bladders in the substance of the plant,) in the sun, and then burning it by degrees in a kelp furnace.

Q. What is that?

A. Seldom anything more than a hole in the earth.

Q. Is anything done with it whilst there?

A. Yes; when the furnace is nearly filled by the burnt fuci, they are briskly stirred with a rake, or hook, till they become of a shining glutinous consistency, not unlike melted iron.

Q. What is then done?

A. It is allowed to cool, and is then ready to be exported.

Q. How is it used?

A. In the manufactory of glass and soap.

Q. What is barilla?

A. The Spanish name of a plant which grows on the shores of the Mediterranean.

Q. What is done with this plant?

A. When fully grown, it is pulled up by the roots, and burnt.

Q. For what purpose?

A. Because the ashes being stirred whilst they are hot, the salt matter which they contain, called soda, forms a solid mass, nearly as hard as stone.

Q. For what is it used?

A. For making glass, bleaching linen, and in the manufacture of hard soap.

Q. What is dulse.

A. Another red palmated fucus, sold in many parts of Scotland as an article of food.

Q. What is samphire?

A. A plant with fleshy spear-shaped leaflets, and small but regular-shaped white flowers, used for pickles and salads.

Q. Where is it found?

A. On steep cliffs, and is gathered by

men who are let down to it from the top by ropes.

Q. Is there not a lichen, called Iceland moss, given as a medicine?

A. Yes; one ounce boiled in a pint of water yields seven ounces of a bitter jelly.

Q. Are not lichens useful for dyeing?

A. Yes; yellow, brown, blue, purple and scarlet are all obtained from lichens.

Q. What is litmus?

A. A substance obtained from the lichen roccella tinctoria: it is used in dyeing, and as a test to ascertain the presence of acids, under the name of blue test paper.

Q. What is orchil.

A. A violet-red paste, prepared from the lichens roccella tinctoria and fuciformis; the latter is now almost exclusively used. Some specimens of this plant were exhibited in the Crystal Palace, from Ceylon, supposed to be worth £380 per ton.

Q. What is madder?

A. A plant which grows in various European countries, but the best is brought from the Levant: it is used in

dyeing red: the colouring matter resides chiefly in the roots.

Q. What is Brazil wood?

A. The wood of a large crooked knotty tree, which grows in great abundance in the province of Pernambuco, in Brazil.

Q. What is it used for?

A. For dyeing silk of a crimson colour; and in combination with certain mordants and alkalies, it will give various shades of red, purple, and scarlet. It is also used in making red-ink.

Q. What are mordants?

A. Substances which have a chemical affinity for colouring matter, and serve to fix colours: alumina, tin, oxide of iron, and alum are used as mordants.

Q. What is logwood?

A. The wood of a tree found in Campeachy, in the bay of Honduras.

Q. What colour does logwood produce?

A. A violet colour; and, in combination with other ingredients, a black-dye.

Q. What insect is the means of producing one of the materials for our common ink?

A. The gall-fly. Gall-nuts are generally supposed to originate from a punc-

ture made by this insect: they are the produce of a prickly-cupped oak, which grows wild in almost all the countries bordering upon the Mediterranean, and in some of the southern provinces of Germany.

Q. What is indigo?

A. A valuable dye prepared from leaves and stalks of the indigo plant. They are bruised and fermented in water, and then deposit a blue powder, which is collected and dried in cakes.

Q. Where does indigo grow?

A. In America and the West Indies; it was called anil when first introduced into England.

Q. What is woad?

A. A plant which from the earliest times has been used for dyeing. The ancient Britons are described by the Romans as having their bodies stained with the colouring matter of this plant.

Q. Where does it grow?

A. It is indigenous to England, and is cultivated in the Azores, Canary Islands, Italy, Switzerland, and in parts of Germany and Sweden.

Q. How is it prepared?

A. The colouring matter is obtained from the leaves: they are first dried, then ground in mills, and formed into a sort of paste. They are afterwards made into balls and allowed to ferment and fall into a dry powder.

Q. Is it now fit for use?

A. Yes; and forms the basis of several other colours besides blue.

Q. What coloured dye is produced from saffron?

A. Yellow. The colour is procured from the dried stigmata.

Q. Where does it grow?

A. It is a native of Greece and Asia Minor, and is extensively cultivated in Austria, France, and Spain, and also in England.

Q. Is it used for any other purpose than dyeing?

A. Yes; it is used medicinally.

Q. Is there not an English plant which yields a yellow dye.

A. Yes, weld: no substance in either the vegetable or mineral kingdom produces a finer yellow than weld, or wold.

Q. Where does it grow?

A. It thrives in old stone quarries,

upon the rubbish of lime kilns, and waste places of the road; but the wild plant does not produce so much colouring matter as that which is cultivated.

Q. How is it prepared?

A. It is pulled up by the roots about the end of June, before the seed is quite mature: it is then dried and tied up in bundles for use.

Q. What is annotto?

A. A colouring substance obtained from the berries of a tree which grows both in the West Indies and in Java and Sumatra.

Q. For what is it used?

A. To produce a deep orange colour: by varying the mode of preparation the Brazilians procure a permanent crimson colour from annotto.

Q. What is turmeric?

A. A yellow dye obtained from a plant indigenous to the East Indies, other parts of Asia, and to Madagascar. It has also been cultivated in Tobago. It is used to give a colouring to curry-powder, and in England is sometimes used as a substitute for saffron.

Q. What is curry-powder.

A. A powder, made of spices and hot vegetables, much eaten in India.

Q. What is gamboge.

A. A bright yellow resinous gum, obtained from a tree which grows on the banks of the Kamboja, a river of Siam.

Q. How is it obtained?

A. By breaking the leaves and young shoots of the plants, and by incisions in the bark.

Q. Is it not sometimes used as medicine?

A. Yes; but, being a powerful one, great care is needed.

Q. What is bistre.

A. A burnt oil, extracted from the root of beech-wood: it is of a citrine-brown colour.

Q. What is cochineal?

A. An insect highly prized for its valuable qualities in producing the dye that bears its name. The female, which is alone valuable, is about one-eighth of an inch in length.

Q. How often in the year are the cochineal insects collected?

A. About three times: great care is necessary in the tedious operation of

gathering them from the nopals on which they feed. This is done, by means of a squirrel's or stag's tail, by the Indian women, who, for this purpose, squat down for hours beside one plant.

Q. How are the cochineal insects killed?

A. By throwing them into boiling water, exposing them to the sun, or drying them in ovens used as vapour baths. This last process renders them the most valuable, as it preserves the whitish powder on the body of the cochineal, and renders it less subject to the adulerations practised by the Indians.

Q. What is added to the dye of the cochineal to improve its colour?

A. A solution of tin.

Q. What are kermes?

A. Round reddish grains found in Spain, Italy, and the south of France, adhering to the branches of the scarlet oak: they are the nidus, or nest, of a minute red animalcule.

Q. What is ivory-black?

A. Burnt ivory: this black is used for miniatures.

Q. What is lac?

A. A resinous substance, the produce of an insect formerly supposed to be a kind of ant, but now ascertained to be of the cochineal species.

Q. Where is it procured?

A. In the East Indies, where it is found on various trees in great abundance.

Q. What is stick lack?

A. The substance in its natural state encrusting small twigs: when broken off and boiled in water it becomes seed lac.

Q. How is shell lac prepared?

A. By melting it and reducing it to a thin crust.

Q. What is lac used for?

A. In India it is formed into beads and other ornaments: when mixed with sand it forms grindstones.

Q. To what other purposes is it applied?

A. It is used in making black and red sealing-wax, mixed with ivory-black or vermillion for various varnishes and lacquers, and for dyeing scarlet cloth. It is also used in making a superior kind of ink.

Q. What are wafers made of?

A. Flour, mixed with the white of eggs, isinglass, and a little yeast, and coloured with vermillion, indigo, saffron, and other things.

Q. What are sulphates?

A. Combinations of sulphuric acid with any earthy, alkaline, or metallic basis.

Q. Is sulphate of copper, or blue vitriol, used in dyeing?

A. Yes; the beautiful green, called mineral green, is formed from it; and fowling-pieces and tea-urns are browned by washing them with a preparation of it.

Q. What is malachite?

A. A green copper ore resembling jasper: it will take a fine polish. The best specimens are brought from Russia.

Q. What is it used for?

A. It is manufactured into vases, trinkets, and is used for doors, slabs, &c., and also in making a green paint.

Q. What is white lead?

A. A carbonate of lead, much used in painting: it is prepared by exposing sheets of lead to the fumes of an acid, until the surface becomes encrusted with a white coat, which is the substance in question.

Q. What is umber?

A. A dusky coloured earth or ore, affording a fine dark brown colour: it was formerly brought from Umbria, in Italy.

Q. How is it used?

A. Either in its natural state, after being washed; or burnt, when its colour is different.

Q. What is cobalt?

A. A metal of a grey colour, with a shade of red, and very brittle.

Q. What are its uses?

A. Its oxide is employed in colouring porcelain, enamelling, and for other purposes.

Q. What makes cobalt so useful in porcelain?

A. Because the strongest heat will not affect its colour, which is blue.

Q. What is zaffre?

A. The oxide of cobalt, mixed with about three times its weight of calcined and powdered flint.

Q. Is this colour very strong?

A. Yes; a single grain will give a blue tint to 240 grains of glass.

Q. What is smalt?

A. A blue kind of glass, made by melting zaffre with sand and potash.

Q. What is powder blue?

A. Smalt reduced to a fine powder.

Q. What is manganese?

A. The black oxide of a metal of a silvery grey colour.

Q. How is it employed?

A. In the manufacture of the finer kinds of glass.

Q. From what is the brilliant blue, called ultramine, procured?

A. From lapis lazuli: it is found in lumps of a beautiful blue colour, richly variegated with white, and veins of gold.

Q. Is this a very lasting colour?

A. Yes; in many pictures this blue alone has stood, whilst all the other colours have faded.

Q. Is it very costly?

A. Yes; but there is an artificial ultramine, prepared by heating sulphuret of sodium with a mixture of silica and alumina.

Q. How are fine black paints obtained?

A. There are several sorts; two called Frankfort black: one of these is made

from a natural earth inclining to blue, the other from the lees of wine burnt, washed, and ground with ivory, bones, and other things.

Q. What is gum arabic?

A. A gum which flows naturally from the acacia in Egypt, Arabia, and elsewhere.

Q. What is its use?

A. Formerly, gums were considered very valuable in medicine; now they are principally used by the manufacturers of water colours, and dyers.

Q. What is catechu?

A. A gum of a very astringent quality, procured from a species of mimosa which grows in Hindostan, and formerly called terra japonica.

Q. Why had it that name?

A. Because it was thought to be a mineral production.

Q. What is gum tragacanth?

A. The gum of a thorny shrub of that name in Crete, Asia, and Greece.

Q. For what is it used?

A. In calico printing; by shoemakers, and also medicinally.

Q. What is gum sandarach?

A. A resinous substance exuding from a tree that grows in Barbary, and also from the juniper tree; it is used, in powder, to prevent ink from spreading, and is called pounce.

Q. What is manna?

A. The dried juice of different ash trees, but particularly the flowering one, which grows in Calabria and Sicily.

Q. Is our ash a valuable tree?

A. Yes, very; it is hardy, and thrives even in barren soils.

Q. What is one great advantage in its timber?

A. It is nearly as good when young as when old; and if you are obliged to make a fire of wet and green wood, you will find this burns better in that state than any other.

Q. Why is the ash called the husbandman's tree?

A. Because it is superior to any other for agricultural implements, and for poles, ladders, and other purposes where strength and elasticity are required.

Q. Has it any other uses?

A. Yes; the leaves, and even the twigs, are eaten by the cattle with great

avidity; the bark is useful in tanning; the wood when burnt yields a considerable quantity of potash; and a decoction of the leaves is sometimes used as a medicine for rheumatism.

Q. For what was the inner bark of the ash, lime, maple, and elm, formerly used?

A. For books, before the invention of paper.

Q. What did the Romans call this substance?

A. Liber, from which our word library, and the French word *livre*, a book, is derived.

Q. Will you name some others of the best timber trees?

A. Of all our timber trees the oak is the most valuable, and therefore I will mention that first; it being the one of which our ships are principally built.

Q. Why is it preferred for shipbuilding.

A. Because it is hard, tough, tolerably flexible, and not very liable to splinter. It is also much used for staves, laths, and spokes of wheels.

Q. Was much furniture made of it at one time?

A. Yes, before the introduction of mahogany; and rooms were often lined with wainscoat, or panelling, of oak.

Q. Does it not grow very slowly?

A. Yes; it has been remarked, that the trunk seldom increases more than 14 inches in diameter in 80 years.

Q. Why is oak of slow growth preferable to that which grows more rapidly?

A. The timber is more compact and firm, and therefore more durable. The common oak, in Italy and Spain, where it grows faster than in Britain, is ascertained to be of short duration in those countries.

Q. Are there two species in England?

A. Yes; the quercus robur, which produces close-grained solid timber, and the quercus sessi-flora, whose timber is loose and sappy, and liable to decay.

Q. Does it grow very large before it decays?

A. Yes; Dr. Plott mentions an oak at Kercot, under the shade of which four thousand three hundred and seventy-four men had sufficient room to stand.

Q. Which was one of the largest oaks recorded?

A. That in Dorsetshire, 68 feet in circumference, the cavity of which was 16 feet long and 20 feet high, and was used in the time of the Commonwealth, as an ale-house.

Q. To what age does the oak live?

A. It is from three to four hundred years in coming to perfection, and quite as long both in that state and in decaying.

Q. How is the age of the oak discovered?

A. The time it has been growing may be ascertained by the number of rings in its trunk, as it forms a fresh one every year.

Q. Is it useful in any other way than as a timber tree?

A. Yes; but before oak timber is fit for working, the trees should be barked, and stand uncut three or four years, to become perfectly dry.

Q. Is the bark of any value?

A. Yes, for tanning leather; after which it serves for fuel, and for making hot-beds for pines and other plants.

Q. What is done with the sawdust of the oak?

A. It is used for dyeing fustians, and

if rightly managed, produces all the shades of drabs and browns.

Q. What is the fruit of the oak?

A. Acorns.

Q. Are these eatable?

A. They have an astringent, bitter taste when raw; but this they lose, if boiled, or even laid for some time in cold water.

Q. What use did the ancient Britons make of them?

A. They made bread of them; and they might now be so used in times of scarcity.

Q. Are they of any other use?

A. Pigs are fed with them; on some parts of the continent, a kind of coffee is prepared from them; and if pressed, they will yield an oil which may be used for lamps.

Q. What wood is considered next in value to the oak, for ship building?

A. Teak-wood; it is even superior in one respect.

Q. What is that?

A. It possesses an oily quality, which preserves the wood and the metal, neces-

sarily employed in the ships, for a much longer period.

Q. Does the oak possess this property?

A. No; there is a corrosive quality in it, which has the effect of destroying the iron work.

Q. How long will ships made of teak-wood last?

A. Nearly eighty years.

Q. What other valuable quality has it?

A. It is the only Indian wood that cannot be penetrated by the white ant.

Q. What sort of wood is it?

A. Strong, light, and easily worked at all ages. It is one of the largest trees known.

Q. Where does it grow?

A. In Java, Ceylon, Malabar, and Coromandel, but especially in the empire of Birmah and Pegu.

Q. Where are these places?

A. Java and Ceylon are East Indian islands; Malabar is a province on the west of Hindostan; Coromandel on the east; and Birmah and Pegu, to the east of the bay of Portugal.

Q. What is mahogany?

A. A large tree, with winged leaves and small white flowers.

Q. Where does it grow?

A. In Jamaica and Honduras; but the supply from Jamaica being now nearly exhausted, mahogony is chiefly brought from the Spanish Main and several of the larger West India Islands.

Q. Does it grow in the East Indies?

A. Yes; to a larger size than that in America; but the colour of the wood is a dirty dark red. There is also a species of mahogany, called Gambia, brought from Africa.

Q. How is it cut?

A. Sets or gangs of negroes, from ten to fifty each, are sent into the woods about August, to look for the trees, which are easily distinguished, at that season, by the reddish yellow hue of their leaves.

Q. What is then done?

A. Stages are raised against each tree, so as to allow it to be cut off about twelve feet from the ground.

Q. Is this hard work?

A. Yes; but the last day of felling is one of feasting and enjoyment.

Q. What is done with the wood?

A. It is drawn to the river side, and pushed into the water, where it is formed into rafts, and floated to the owner of it.

Q. Is mahogany very valuable?

A. Very; being so beautifully veined and taking so high a polish. Messrs. Broadwood, at one time distinguished piano-forte makers, gave £3,000 for three logs, all cut from one tree.

Q. How were they used?

A. Cut into veneers of eight to the inch.

Q. What are veneers?

A. Thin slices of valuable woods cut with the greatest nicety by saws attached to wheels.

Q. How are veneers used?

A. They are cemented to wood of inferior value, by which mahogany furniture is rendered cheaper than it would be if solid.

Q. Which is the best?

A. That from Jamaica.

Q. When was it first brought into England?

A. In 1724.

Q. Is the fir a timber tree?

A. Yes; of which there are a great many varieties.

Q. Will you name some of them?

A. The Scotch fir, or pine, is said to produce better timber than any other; but it grows slowly, and not in great numbers.

Q. What is the wood of the pine called?

A. Deal; and, from being more easily worked than other wood, is called builders' timber.

Q. Where are the largest forests of these firs?

A. In Sweden and Norway.

Q. How are they brought here?

A. They are floated down the rivers to the sea, and brought over in ships.

Q. What makes the fir so useful in building?

A. Its lightness and stiffness, which renders it superior to any other material for beams, girders, joists, and rafters.

Q. What is a girder?

A. The principal piece of timber in a floor, usually framed into other pieces called brest-summers.

Q. What are joists?

A. Secondary pieces of timber which have one end fixed in the girder and the other in the wall.

Q. What are rafters?

A. The smaller pieces used in the roof.

Q. Are pines large trees?

A. The cedar of Lebanon is one species remarkable for its size and durability. We are told that the timber of it in the temple of Apollo at Utica was found undecayed after the lapse of two thousand years. The Canadian, or yellow pine, often grows straight eighty feet: the white pine is the loftiest tree in the United States of America, attaining the height of 150 feet with a trunk five feet only in diameter.

Q. Does the Scotch fir make good charcoal?

A. Yes; it is also used for the breasts of violins, or the sounding boards of other musical instruments; but still more important articles are furnished by it.

Q. What are these?

A. Tar, pitch, and turpentine, of which articles it supplies four-fifths of the consumption in the European dock-yards.

Q. What is tar?

A. A thick black matter, obtained from the roots and refuse parts of these trees, by setting them on fire, when it oozes out.

Q. What is pitch?

A. A thick, tenacious, oily substance, generally obtained by thickening tar, or by boiling it until it has acquired the proper consistence.

Q. What is shoemaker's wax?

A. Pitch, mixed with a certain quantity of oil and suet.

Q. What is carriage grease?

A. Pitch and whale fat.

Q. What is turpentine?

A. The resinous juice chiefly of this fir, obtained by boring holes into the trunks of the trees early in spring, and placing vessels under them for it to flow into.

Q. What is oil of turpentine?

A. An essential oil, obtained by distillation, which is extremely pungent.

Q. What is left when the oil is taken out?

A. Common resin.

Q. What is Burgundy pitch?

A. A fine clear oil which oozes from incisions made in the spruce fir; it is boiled in water, and then strained.

Q. Is the date tree a palm?

A. Yes; the leaves of the date, under the name of palms, are sent to Italy, to be used in the ceremonies of Palm Sunday.

Q. Which is Palm Sunday?

A. The Sunday before Easter, when the multitude cut down palm trees and strewed them in the path of our Lord.

Q. Where is the date principally cultivated?

A. On the African coast of the Mediterranean, and in several parts of Persia, Arabia, and in Spain.

Q. Is it useful?

A. Extremely so. Almost every part of this precious tree answers some purpose; the fruit is a chief article of food where it grows; the wood is made into beams, rafters, and implements of husbandry.

Q. What are some other of its uses.

A. A liquor is drawn from the trunk called palm wine; the leaves, after being steeped in water, are sufficiently pliable to

be formed into baskets and hats; the fibres of the stem of the leaves are made into cords and twine. In Egypt the nuts and stones are used to feed the cattle; in China, they are burnt and employed in the manufacture of Indian ink; and in Spain they make a charcoal of them.

Q. What is the fruit of the palm?

A. The cocoa-nut; it affords the means of food, clothing, and protection to hundreds.

Q. Can a liquor be obtained from these trees?

A. Yes; if the trunk be bored, a white sweetish liquor exudes from the wound, called toddy, which is a favourite beverage where they grow; by distillation of this liquor, a spirit is made called arrack.

Q. Is sago procured from one of the palms?

A. Yes; it is the inner pith of one.

Q. How is it prepared?

A. The trunk is sawn in pieces, and the pith taken out and beaten in mortars; water is then poured upon the mass, and it stands for some time to settle.

Q. What is then done?

A. It is strained through a coarse cloth, to separate all that is eatable, which is dried and made into cakes.

Q. Is it brought to England in that state?

A. No; for exportation it is granulated, or made into grains.

Q. Is the birch valuable as a timber tree?

A. No; but various small articles are made from its wood, which is white, firm, and tough. In those parts of the highlands of Scotland where the pine is not to be had, the birch is used for the rafters of cabins, and for the doors, whilst the twigs, when barked, form durable cordage.

Q. What kind of a tree is the alder?

A. It is useful for foundation piles, and for pipes under the streets, as it lasts much longer in water than birch; the bark is used for tanning, and some of its roots and knots are so beautifully veined, as to be used for furniture.

Q. Is the beech a native of England?

A. It is thought so, and is one of the handsomest forest trees we have.

Q. What is the fruit of this tree?

A. Beech mast, which falls in September, and is very palatable.

Q. How does it grow?

A. In a triangular husk, covered by prickles.

Q. Is the wood useful?

A. Yes; to cabinet-makers and turners. The woodwork of mechanical tools are mostly made of beech, being hard, smooth, and brittle.

Q. What is ebony?

A. The centre part only of a palm tree which grows in India, Madagascar, Ceylon, and the Mauritius.

Q. How is it obtained?

A. The outside wood is soft, which is eaten by insects, leaving the inside black part untouched.

Q. What is it useful for?

A. It is used by cabinet-makers for inlaying and ornamenting furniture, as it is a hard wood and takes a very fine polish.

Q. What kind of a tree is a chestnut?

A. It is a timber tree bearing fruit, and so much like the oak, as to require a good judge to tell the difference.

Q. Is it as durable as the oak?

A. Young chestnut has been found, by various experiments, to be superior to young oak for all manner of wood-work that has to be partly underground.

Q. Is not the fruit used for bread in some countries?

A. Yes; in some provinces of France, and in Corsica, this fruit constitutes the principal food of the poorer people. It is made into bread after being deprived of its astringent and bitter qualities.

Q. Is it long-lived?

A. Yes; there is no account of an oak having lived so long as the celebrated chestnut tree at Tortworth, in Gloucestershire.

Q. How is that known to be so very old?

A. Because it is known to have been a boundary mark in the reign of King John, and is supposed to have been then more than 500 years old, which makes its age now to exceed 1,100 years.

Q. Is the horse chestnut of the same species?

A. No; the wood of the horse chestnut is of little value, being white and soft.

Q. Is it a handsome tree?

A. Yes; one of the most beautiful we possess, on account of its brilliant appearance at a very early season.

Q. How do the flowers grow?

A. In upright conical spikes, at the ends of the branches, on all sides.

Q. What kind of a tree is the mulberry?

A. The wood is hard and yellow, much used for carving and turnery, and the fruit is very delicious; a juice is made from it for medicinal purposes.

Q. What is done with the leaves?

A. They are the principal food of the silkworm, particularly those of the white mulberry.

Q. Is the walnut a timber tree?

A. Yes; it was much used for furniture before the introduction of mahogany; but it is now little used, except for gun stocks.

Q. Is the nut pickled?

A. Yes; before it is ripe, and often made into ketchup.

Q. What is that?

A. A liquor extracted from them and mushrooms, to flavour sauces and gravies.

Q. What is rosewood?

A. The wood of an odoriferous tree, which takes its name from the smell being like that of a rose, when newly cut. It was first introduced from the Island of Cyprus, though the great supply now comes from Brazil.

Q. Where do those trees grow which produce the balm of Gilead?

A. In several parts of Abyssinia, Arabia, and Syria.

Q. Where are Abyssinia and Syria?

A. Abyssinia is an empire of Africa; and Syria, or Suristana, a province of Asia.

Q. For what is the maple useful?

A. For musical instruments: not containing any of those hard particles which are injurious to tools, it is employed for cutting-boards; and not being apt to warp by variations of the atmosphere, is used for saddle-trees, wooden-dishes, &c.: it is also used by turners.

Q. Is there another kind of maple?

A. Yes; in North America there is one called the sugar maple.

Q. Why?

A. Because it yields a juice which may be converted into sugar by evapora-

tion, and which can be clarified and refined like other sugar.

Q. Can this juice be made into anything else?

A. Yes; a pleasant wine, and an excellent vinegar.

Q. Is the wood of this tree useful?

A. Yes; and particularly as it is said that insects do not destroy it.

Q. Would it grow in our country?

A. So it is believed, as it can bear cold; and it seems very desirable that it should be cultivated here.

Q. Is the wood of the cypress tree valuable?

A. Yes; it is hard, compact, of a pale reddish colour, with deep veins, and a pleasant smell.

Q. Is it a durable wood?

A. It is indeed; for Pliny tells us, the gates of the Temple of Diana, at Ephesus, though then nearly 400 years old, looked nearly as fresh as new.

Q. Were there any other gates made of it?

A. Yes; those of St. Peter's, at Rome; they lasted more than a thousand years, from the time of Constantine to that of

Pope Eugenius the 4th, when they were replaced by gates of brass.

Q. Did the Romans prize this wood?

A. So much so that the image of Jupiter in the Capitol, was made of it.

Q. Did the Egyptians use the cypress?

A. Yes; the coffins in which the Egyptian mummies are found, are usually of that material.

Q. Does it take a polish?

A. Yes; a very fine one, and is not liable to the attacks of insects.

Q. Whence has it its name?

A. From the island of Cyprus?

Q. Where is that?

A. In the Mediterranean.

Q. Is box a tree?

A. Yes; though generally only a shrub: it sometimes grows to a tree of twelve or fifteen feet in height.

Q. Why did the Romans and our ancestors admire the box tree?

A. Because its foliage could be easily cut, and formed into the shape of animals and other things.

Q. What makes this so easy?

A. The slowness of its growth, and the closeness of its leaves.

Q. Why is this wood so valuable?

A. Because it is close-grained, heavy, and firm in its texture: it is the only wood applicable for the many splendid illustrations to the publications of the present day, commonly called wood-cuts.

Q. How are permanent figures and ornaments often impressed upon box?

A. The wood is softened by the application of heat and moisture, and the die being strongly pressed upon it, the impression comes off and is retained.

Q. Was box ever more common in England than at present?

A. Yes; and it has given name to several places, particularly Box-hill, in Surrey.

Q. What are evergreens?

A. Trees, whose leaves are constantly renewed.

Q. What is the holly?

A. A bright evergreen, with sharp prickly leaves; the flowers grow in clusters, and are succeeded by bright red berries.

Q. Is the wood of any use?

A. Yes; it is the hardest of all white

woods, and is used by inlayers, millwrights, and turners.

Q. What is the difference between resin and gum?

A. Resins can be dissolved in spirit only, while water alone dissolves gum.

Q. Is camphor the produce of a tree?

A. Yes; of the bay tribe: it is procured from every part of it.

Q. How is it extracted?

A. In Borneo and Sumatra they pick it out with sharp instruments; in China they boil the wood and obtain it.

Q. What is the use of camphor?

A. It is very valuable in medicine, and is used in the cases of stuffed animals, to preserve them from the attacks of insects.

Q. Is the wood useful?

A. Yes; it is in much request by carpenters, being light and durable.

Q. Do any of our shrubs and plants contain camphor?

A. Yes; cinnamon, cassia, ginger, thyme, the rosemary, sage, lavender, and marjoram. The camphor-tree of Japan is not of the same species.

Q. Is the common sweet bay occasionally used in cookery and medicine?

A. An oil is used in medicine which is expressed from the leaves, and it is also used in cookery to flavour food.

Q. What is sassafras?

A. The wood of a bay which grows in North America.

Q. How is this wood used?

A. It is used medicinally in infusions and decoctions.

Q. What is the difference between an infusion and a decoction.

A. An infusion is that which has boiling water poured upon the article; a decoction means boiled; and maceration, being steeped in cold water.

Q. What is saloop?

A. Saloop, or salep, is the name given to the dried tuberous roots of different species of orchis, especially of one imported from Persia and Asia Minor.

Q. What is its appearance?

A. It is of a whitish yellow colour, very hard, with a faint peculiar smell: it is a nutritious article of diet, much valued in the East. A decoction of the

root is used at meals, or as a beverage, in some parts of England.

Q. What is lignum vitæ?

A. The wood and resin of a large West India tree.

Q. What resin is obtained from this tree?

A. Gum guaiacum: the best kind oozes from the bark.

Q. Is there a different way of obtaining it?

A. Yes; by boiling the chips and sawdust of the tree.

Q. How is this gum employed?

A. As a strengthening medicine, and as a remedy for rheumatic and other pains.

Q. What is gum sandarach?

A. A resinous gum, from the bark of the common juniper, of a pale yellowish tint, very brittle, and inflammable.

Q. Of what taste is it?

A. Pungent and aromatic, and emitting a fragrant odour when burnt: it is imported in small pieces, or tears, as they are called, about the size of peas.

Q. What is gutta percha?

A. The sap of a tree abounding in

the Peninsula of Malay, in Singapore, and Borneo, &c.

Q. How is it obtained?

A. By tapping or cutting notches in the branches at certain intervals of time.

Q. For what is it used?

A. For an almost endless variety of purposes, as its elasticity, its flexibility, its power to resist cold and damp, render it invaluable, both in the arts and manufactures.

Q. Can you name a few of the uses to which it is applied?

A. Yes; to make water-pipes and tubes for the conveyance of chemical liquids, buffers for railway carriages, gunpowder canisters; and boats formed of this material have been found especially useful in the Arctic Regions.

Q. Is it of any use in ornamental work?

A. Yes; when softened by heat, it will receive any mould with the most delicate precision, and is now used for the formation of many of those articles which were formerly constructed of papier maché.

Q. What kind of wood is that of the juniper tree?

A. It is of a reddish colour, very hard and very durable.

Q. For what is the wood of the yew tree valuable?

A. For veneering; from its being beautifully veined, and taking so high a polish.

Q. What is copal?

A. A resinous substance, which is imported from the Spanish colonies in America.

Q. How is it made into the beautiful varnish of that name?

A. By dissolving it in spirits of wine, turpentine, and linseed oil.

Q. What is the bread fruit?

A. A very useful fruit, which grows in the south-eastern part of Asia and the islands of the Pacific; it continues in season eight months, and is eaten by the natives in various ways.

Q. What navigator gave us the earliest account of the bread fruit?

A. Captain Dampier, so early as 1688.

Q. What is it like?

A. It is a large round berry, the size

of a child's head, of a pale green, with a substance between the skin and core as white as snow, and something like new bread.

Q. For what purpose did Lieut. Bligh go out in the ship Bounty, in 1787?

A. To take the bread fruit to the West Indies.

Q. Did he succeed in doing so?

A. Not at that time, owing to the breaking out of a mutiny in his ship; but he took it there in 1791.

Q. What became of the mutineers?

A. They settled in an uninhabited island in the Pacific Ocean; and they and their descendants were discovered there in 1814.

Q. What is the Plantain?

A. A fruit of a pale yellow colour, somewhat like a cucumber in shape, and about a foot long.

Q. How does it grow?

A. In bunches on a tree with a soft stem, twenty or thirty feet high, with leaves eight feet long and two broad, so thin that the wind can tear them.

Q. Does this tree grow quickly?

A. Very; it is said, that if a line be

stretched across, on a level with the top of one of these leaves when it begins to expand, it will be found to have grown an inch in the course of an hour.

Q. Is this a useful plant?

A. Extremely so; many thousand acres are planted with it in Jamaica alone. It is eaten in various ways, generally before it is ripe.

Q. What is the banana?

A. A valuable plant, which grows in the West Indies, and bears the same kind of fruit, but not more than four or five inches long.

Q. How is it eaten?

A. It is preserved like a fig, by being dried in the sun. Meal is also extracted from it by cutting it in slices, drying it in the sun, and then pounding it.

Q. Does it require much cultivation?

A. No; the plants merely require digging round the roots once or twice a year.

Q. What is chocolate?

A. A kind of hard paste, the principal part of which is the pulp of the cocoa, or chocolate nuts.

Q. Where do they come from?

A. From the West Indies, and South America, where they grow upon a tree somewhat like a young cherry tree, with beautiful saffron-coloured flowers.

Q. Of what shape and colour is the fruit?

A. The shape of a cucumber, green whilst growing, then changes to a bluish red colour, with pink veins, and containing from twenty to thirty nuts.

Q. Who first brought it into Europe?

A. The Spaniards, from the Caraccas, and that is still considered the best.

Q. Where are the Caraccas?

A. The Caraccas, or Venezuela, is a large track of land in South America.

Q. Can you tell me of any remarkable tree that grows in the Caraccas?

A. The cow tree, or palo de vaca; it grows on rocks, and has dry and leathery leaves, and produces a kind of milk.

Q. How is the milk procured from it?

A. By incisions made in the trunk: the milk is tolerably thick and of an agreeable balmy smell. At sun-rise the natives may be seen hastening from all quarters furnished with large bowls to receive the milk.

Q. Can you mention any other tree which furnishes an agreeable beverage?

A. Yes; that called the travellers' tree of Madagascar, the leaves of which yield a copious supply of fresh water, very grateful to the traveller.

Q. In what description of countries does this tree grow?

A. In the most arid; and is thus another proof of the tender care of our Heavenly Father in supplying all his creatures' wants.

Q. What is coffee?

A. The seeds of an evergreen shrub, cultivated in hot climates, but principally in Arabia and the West Indies.

Q. What is the size of the tree?

A. It will grow to 16 or 18 feet, but is generally kept down to five feet, for the convenience of gathering.

Q. Does it bear any flower?

A. Yes; one something like the jessamine, quite white, and very fragrant.

Q. What is the fruit like?

A. About the size of our cherry, but oval; and, when ripe, of a deep red.

Q. How is it gathered?

A. It is shaken off the trees; then

spread upon mats, so that the sun may dry the pulpy substance, which surrounds the seeds.

Q. What is then done?

A. They are broken by heavy rollers; again dried, then winnowed with a large fan, to clear away the bits of husk.

Q. Are the pulp and seed which surround the skin of any use?

A. Yes; the Arabians use them as coffee; and the former is particularly esteemed, and constitutes the coffee 'a la Sultane,' but will not bear exporting.

Q. How old must the coffee tree be before it will bear?

A. Three years; but it is not in full bearing before five: a tree does not usually give a pound of coffee; but one in great vigour, will yield three or four.

Q. How is this coffee prepared as a beverage?

A. It must be roasted till of a dark brown colour; after which it is ground, and either infused or boiled in water.

Q. Has coffee been long drank?

A. No; it seems to have been quite unknown to the Greeks and Romans; but to have been used in Ethiopia. It

was first introduced into Constantinople in 1554.

Q. When do we first hear of it in England?

A. In 1652, when Mr. Daniel Edwards, a Turkey merchant, brought home a Greek servant, called Pasqua, who understood the method of roasting and preparing it.

Q. Is coffee wholesome?

A. Yes, when not too strong: it is also said to be a good antidote against an overdose of opium, and to be useful in relieving asthma.

Q. By what people is coffee supposed to have been first used?

A. By the Persians, and to have been gradually adopted by neighbouring countries, passing, in the 15th century, into Aden, thence to Mecca, afterwards to Cairo, and from Egypt to Syria and Constantinople.

Q. What is tobacco?

A. The dried leaves of a narcotic plant, annually cultivated in North America.

Q. From what does it take its name?

A. From being originally brought from Tobago.

Q. Where is that?

A. An island in the bay of Panama, near the coast of America.

Q. By whom was it first brought to England?

A. Sir Walter Raleigh, in the reign of Elizabeth.

Q. What droll story is connected with that event?

A. Sir Walter having one day sent his servant for some water, the man was so alarmed on his return by seeing his master enveloped in smoke, that he threw the contents of the jug in his face.

Q. Is snuff made from tobacco?

A. Yes; but with other things added to give it pungency, or a peculiar smell.

Q. Is tobacco smoke useful in destroying insects?

A. Yes; gardeners often blow it against their hot-house and green-house plants, &c., for that purpose.

Q. What is the deadly night-shade?

A. A plant which grows wild in many parts of England; and against which persons ought to be placed on their guard, as the berries are very poisonons.

Q. What are capers?

A. The unopened flower-buds of a low shrub, which grows from the crevices of rocks in France and Italy.

Q. Are any other buds used instead of these?

A. Yes; those of the marsh marygold and nasturtium.

Q. How do you distinguish spices otherwise than by the names they are commonly known by?

A. They are aromatic, dry, pungent, tropical, stimulating, and vegetable.

Q. What do you mean by tropical?

A. Coming from between the tropics, or that part of the globe which lies between the tropic of Capricorn, and the tropic of Cancer, and has the equator passing through the middle of it.

Q. What are the tropics?

A. Imaginary lines marked on the globe.

Q. How are the different climates marked?

A. By names given to them for the purpose; they are called zones, and are five in number; the north and south frigid zones are situated round the two poles, and are never free from ice and

snow; and the two temperate zones are between these and the tropics.

Q. What is that one called between the tropics?

A. The torrid zone, where the sun is directly over some part at a certain season of every year.

Q. What is pepper?

A. The berry of a creeping shrub, much like the vine, planted near a thorny bush, and twines about it like ivy.

Q. How do the berries grow?

A. In clusters, each containing several seeds.

Q. What is the difference between black and white pepper?

A. For black pepper the berries are gathered before they are ripe, and rubbed till the seeds are separated.

Q. What is then done?

A. The seeds are exposed to the sun, and put into jars at night, to keep them from the dew.

Q. How is white pepper managed?

A. For white pepper the berries are allowed to ripen, when they become red, and are then steeped for a week in salt and water, when the skins burst; they

are then rubbed in a basket, the pulp removed by washing, and the seeds dried.

Q. What is allspice?

A. The dried berry of a beautiful and fragrant species of myrtle, indigenous to the West Indies, called the Pimento tree.

Q. What is the meaning of indigenous?

A. A production growing naturally in any country.

Q. What does this tree produce?

A. Numerous bunches of white flowers, which are succeeded by berries.

Q. How are they gathered?

A. By hand, when fully grown, but not quite ripe; they are about the size of pepper corns, which are dried in the sun and kept from damp.

Q. What is cayenne pepper?

A. It is made from the fruit of different kinds of the capsicum, a plant from South America, with hollow pods of a red or yellow colour, containing many small kidney-shaped seeds.

Q. What are cloves?

A. The unopened flower-buds and calyx of a species of laurel which grows in the West Indies.

Q. What is the calyx?

A. The small leaves, generally green, which grow just under the petals, or leaves, of the flowers.

Q. When are cloves gathered?

A. When the four points of the calyx project one over the other, forming a bud about the size of a pea.

Q. What is done to them after they are gathered?

A. They are exposed for some time to the smoke of a wood fire, and then dried in the sun.

Q. What are nutmegs?

A. The kernels of a fruit which grows in the East Indies, on a tree not unlike our cherry tree.

Q. How do they grow?

A. On small slender stalks, and much resemble a small peach, both in shape and colour, only pointed towards the end.

Q. How is it known that they are ripe?

A. The husk opens, and shews a bright scarlet net-work, which is mace; these husks are stripped off in the wood.

Q. What is done with the mace?

A. It is taken off very carefully, with a small knife, and dried, when it becomes yellow.

Q. What is done with the nuts?

A. They are dried over a slow fire upon split bamboos, still having upon them a hard woody shell, which is easily broken: the nuts are taken out and packed for exportation.

Q. What is cinnamon?

A. The inner bark of the branches of a kind of laurel, which grows in Ceylon and Malabar.

Q. How did it reach Jamaica?

A. Admiral Rodney took a vessel in 1782, with many oriental productions on board, which he gave to that island.

Q. How is the cinnamon gathered?

A. The outer bark is scraped off, and the inner ripped up and gradually loosened till it can be taken off entire.

Q. How is it dried?

A. It is cut into pieces and exposed to the sun; and as it dries it curls into rolls, called quills, which are slipped one into the other, and tied up in bundles.

Q. Is it the bark alone which is useful?

A. No; the leaves and roots yield a very valuable oil.

Q. What is wild cinnamon?

A. The bark of a tree which grows in the East Indies and China, and was much prized before cinnamon came into such general use. It it also called cassia.

Q. What is ginger?

A. The dried root of a plant resmbling a rush, which grows wild in many parts of the East and West Indies.

Q. How is it prepared for use?

A. In two ways: for white ginger, which is the most expensive, it is scraped, washed, and dried in the sun with great care.

Q. How is black ginger prepared?

A. The roots are immersed in boiling water and dried: this makes them lose some of the essential oil, and causes the black colour.

Q. Is it ever eaten fresh?

A. Yes; in the West Indies, in salads and with other food. For preserving in sugar, the roots are dug up when they have been planted only three or four months.

Q. What is betel?

A. The leaf of a climbing East Indian plant, like the ivy, the leaves somewhat resembling those of the citron.

Q. How do the Indians use it?

A. They chew it after meals, during a visit, and it is offered to friends when they meet and when they separate.

Q. How do they correct the bitterness of the leaves?

A. By adding some of the nut with a mixture of burnt lime made of shells.

Q. What size is the nut?

A. About the size of a small egg, of an orange colour, and encloses a nucleus resembling a nutmeg.

Q. What are cardamoms?

A. The seeds of an East Indian plant, which has shining stalks and glossy leaves.

Q. How are they gathered?

A. From pods, which are pulled from the stalks and spread upon mats to dry, and are then ready for exportation.

Q. What are carraway seeds?

A. The seeds of an umbelliferous plant which grows wild in many parts of England; it is much used by cooks and confectioners.

Q. What is meant by umbelliferous?

A. The flowers expanding like an

umbrella. Many of the plants belonging to this order are deadly poisons.

Q. What are coriander seeds?

A. The seeds of a wild plant cultivated in many parts of England.

Q. How are they used?

A. In confectionary, medicine, and sometimes distilled.

Q. What are anise seeds?

A. The seeds of a plant which grows wild in Egypt and Syria.

Q. What is saffron?

A. Saffron is prepared from the stigmas, with a portion of the style, of a species of crocus; a native of Greece and Asia Minor, and cultivated abundantly, for medicinal purposes, in Cambridgeshire and Essex.

Q. How is it formed into cakes?

A. The stigmas are dried on a portable kiln, upon which a haircloth, covered by several sheets of white paper, is laid: the saffron is spread between two and three inches thick, and is then covered with other sheets of paper, and over them a coarse blanket.

Q. How long is the saffron kept in this kiln?

A. For twenty-four hours: at the end of the first hour it is turned, and at the end of the second the heat is moderated; after which time the saffron requires turning every half hour.

Q. What town derives its name from the cultivation of saffron?

A. Saffron Walden.

Q. What is orris root?

A. The root of an iris, called Florentine, a native of Italy, dried and powdered, and used to perfume hair powder.

Q. What is angelica?

A. A plant with a fragrant, aromatic smell, and pleasant bitter taste, often preserved with ginger.

Q. What is millet?

A. The seeds of a grass-like plant, which grows in India and Africa.

Q. Will it make bread?

A. It is brown and heavy as bread; but some persons prefer it to rice for puddings, and it is excellent for poultry.

Q. Is it of any other use?

A. Yes; a good vinegar is made from it by fermentation; a strong spirit by distillation; and a sugar may be obtained from the stalks.

Q. What is rice?

A. A grain much cultivated in the East Indies, America, and some parts of Spain: the husk is taken off before it is exported.

Q. What does it require?

A. Much water and a hot climate.

Q. From whence have we the best?

A. From America.

Q. Did it grow there originally?

A. No; the inhabitants of America are said to be indebted for it to Mr. Dubois, treasurer to the East India Company, who once made a present of a small bag of this grain to a Carolina merchant.

Q. Is it much used for food?

A. No kind of grain so much so in the hot countries: many persons in the East subsist entirely upon it.

Q. What is arrow root?

A. A kind of starch, made from the root of a plant which is cultivated in both the East and West Indies.

Q. Why is it called arrow root?

A. Because the natives use the juice as a remedy for wounds made by poisoned arrows.

Q. How is that obtained which we buy?

A. Roots a year old are dug up, washed, and beaten to a milky pulp, this is washed again, and the fibres picked out; then it is passed through a sieve, or coarse cloth, and left to settle.

Q. Is it now fit for use?

A. No; the water is drawn off, it is washed again, dried in the sun, and reduced to a powder.

Q. What is tous les mois?

A. The starch of the canna coccinea, which grows in most of the West Indian islands. Dr. Robert Christison considers it at least equal to arrow root in every useful property; when cold it congeals like jelly, instead of settling to the bottom.

Q. Is there anything remarkable in the cassava?

A. Cassava is the starchy matter produced from the yanippa manihof. The roots are either made into a kind of bread, or roasted and eaten like potatoes, by the natives of Africa and the West Indies.

Q. Is tapioca made from cassava?

A. Yes; it is separated from the fibrous part of the root, and is the most wholesome portion of it.

Q. Is there any other species of cassava?

A. Yes, the sweet cassava; whose roots are merely roasted and eaten with butter.

Q. Is liquorice the root of a plant?

A. Yes; of one which grows wild in the south of Europe, and is cultivated near Pontefract, in Yorkshire; Worksop, in Nottinghamshire; Godalmin, in Surrey; and near London.

Q. Has it very long leaves?

A. They usually measure five or six feet, and the flowers grow in long spikes.

Q. What sort of root has it?

A. Long, round, and tough; of a brown colour on the outside and yellow within.

Q. What is its chief use?

A. In medicine; it is one of the few sweet things which will allay thirst; it is also much used in brewing porter.

Q. Are not the roots sometimes used instead of corks?

A. Yes; and some persons think

them more wholesome, as well as more durable.

Q. How old must the liquorice roots be before they are in perfection?

A. Three years.

Q. What is cork?

A. The bark of the cork tree, a species of oak, which grows abundantly in Spain, Italy, and France.

Q. How is it procured?

A. Incisions are made down the whole length of the trunk at certain distances, and at each end of these incisions one is made round it, and the bark stripped off.

Q. How old should the cork tree be before the bark is stripped off?

A. Fifteen years: when the bark is taken off the tree it is piled up in a ditch or pond, and heavy stones placed upon it to flatten it. After being dried it is slightly charred, and then packed for exportation.

Q. What makes cork so valuable?

A. Its being so elastic and light, and impenetrable by most liquors.

Q. For what is it employed besides stopping bottles?

A. For buoys to float nets; in the con-

struction of life-boats; and for water-proof soles to boots and shoes.

Q. What is caoutchouc, or Indian rubber?

A. The dried juice of a large tree, which grows in Para, and other parts of South America; in Mexico; and in the East Indies.

Q. How is it procured?

A. The Indians tap the trees, and it oozes out: it looks like milk, and may then be drunk with safety.

Q. Has Indian rubber been long used in England?

A. No; it was quite unknown here a century ago.

Q. When was it used for making water-proof cloaks and other articles?

A. Not till after 1816; before that time it was principally used for rubbing out pencil marks.

Q. Why was it not used sooner for the many purposes to which it is now applied?

A. Because the only method of dissolving it which had then been discovered was by means of ether,—too expensive a process for common use.

Q. What is ether?

A. A light, volatile, and inflammable liquid, produced by distilling equal measures of alcohol, or strong, pure spirits, with sulphuric acid.

Q. What is it now dissolved in?

A. Purified naphtha, from coal tar.

Q. What is vulcanized Indian-rubber?

A. A compound of sulphur, with the vegetable gum. The strength of the Indian-rubber is thus increased to an extraordinary degree, and its elasticity is rendered more permanent.

Q. Where does tea come from?

A. From China, Japan, and Tonquin.

Q. Are the two kinds, black and green, from different plants?

A. They were formerly so considered; but the Chinese assert that the difference is caused by the seasons of gathering and the modes of preparing them.

Q. How are the trees planted?

A. Four or five feet asunder. They are of very stunted appearance, and are not allowed to grow higher than is convenient for men, women, and children to pick the leaves.

Q. What kinds are principally used in Europe?

A. Four of black,—Bohea or Bozee, so called from the country where it grows; Congo, or Congo foo, which means much care or trouble; Souchong, or a small good thing; and Pekoe.

Q. Which are the green teas?

A. The chief are Singlo, named from the place where it is most cultivated; Hyson, called after the Italian merchant who first brought it to Europe; and Gunpowder, named from being in round grains, similar to cannon gunpowder.

Q. How is Bohea gathered?

A. Sometimes at four gatherings, and the leaves are thrown as they are plucked into flat baskets, which are placed in the sun and air all the day.

Q. What is then done with them?

A. They are thrown in small quantities into a flat cast-iron pan, which is made very hot; here they are twice stirred quickly.

Q. What next?

A. They are taken out, put into baskets, and rubbed between men's hands to roll them, and then they are roasted

again in larger quantities over a slower fire, sometimes of charcoal.

Q. What is done with them now?

A. They are spread upon a table; those leaves which are not quite perfect are picked out, and the rest laid aside for packing.

Q. What is Congo?

A. A kind of Bohea less dusty, and with larger leaves; these are gathered with peculiar care.

Q. Is it not said that these leaves are beaten with sticks?

A. Yes; these and Souchong, Hyson, and the fine Singlo teas, are said to be beaten with flat sticks, or bamboos, when they have acquired toughness enough by being exposed to the sun and air, to prevent their breaking.

Q. What is Souchong made from?

A. From trees three years old; and, when the soil is good, from those which are older; but there is very little true Souchong.

Q. What makes it so scarce?

A. Because upon a hill, planted with tea trees, there may be only one whose leaves are good enough to be called Sou-

chong, and of this only the best and youngest can be taken.

Q. How is Pekoe distinguished?

A. By small white flowers being mixed with it.

Q. Is it true that green trees acquire their colour and flavour from being dried upon copper?

A. Certainly not; the leaves are gathered and immediately roasted, or tached, as it is called, upon cast-iron plates, and then much rubbed between the hands, to roll them.

Q. What then?

A. They are again placed over the fire and made very dry; then picked, cleansed from dust, roasted several times, and at length put hot into chests.

Q. Is there only one sort of Singlo?

A. No; there are two or three more; but the leaves of the best are large, fine, flat, and clean; it is gathered in April and June.

Q. Is Hyson gathered all at once?

A. No; there are two gatherings.

Q. How ought it to appear?

A. It ought to have a fine bloom, be of a full-sized grain, very dry, and so

crisp as to crumble into dust when slightly pressed.

Q. What is Gunpowder tea?

A. A superior kind of Hyson, gathered and dried with peculiar care, with a beautiful bloom, which the least breath will destroy.

Q. Has tea been long known here as an article of trade?

A. No; a century and a half ago it was scarcely known; and the first parcel is said to have been brought into Europe by a Dutch merchant, in 1610.

Q. When was it first brought to England?

A. That has not been correctly ascertained; but in 1666, twenty-two pounds and three-quarters, valued at fifty shillings a pound, were presented as a valuable gift to Charles II.

Q. When did the East India Company first import it?

A. In 1669, they imported two canisters of it, weighing 143lbs. 8ozs.

Q. How much is now supposed to be brought every year?

A. Upwards of 50 millions of pounds weight.

Q. Is this trade of any advantage to our commerce?

A. Yes; because it has opened a market for our woollen goods,—one of our principal manufactures.

Q. Is there anything remarkable in the effect of the fresh tea leaves?

A. Yes; they produce giddiness and stupefaction; but these noxious properties are destroyed by roasting.

Q. Are any of the finest kinds of tea perfumed?

A. Yes; with the flowers of the sweet olive, which is cultivated in China for that purpose, and with which tea is packed for land carriage: this makes the tea taken to Russia so much finer than that we get over the sea.

Q. How is tea drunk in China?

A. As with us, only without milk or sugar.

Q. How in Japan?

A. There the leaves are powdered, and diluted with water, until they acquire nearly the consistency of soup.

Q. How is this managed?

A. The cups and saucers, &c., are placed before the company with a box

containing powdered tea; the cups are then filled with warm water, and as much of this powdered tea as will lie on the point of a knife is put into each, and stirred till it begins to foam, when it is given to the company.

Q. What are gourds?

A. An American fruit; and that kind which is called the bottle gourd, has a woody rind, so hard it can be used as cups, bottles, and many other utensils.

Q. What is the banyan tree?

A. One of the greatest wonders of the vegetable kingdom; growing in the East Indies.

Q. How so?

A. It never dies, but extends itself, by every branch striking into the ground and becoming a tree, whose branches again extend in the same manner.

Q. What fruit does it bear?

A. Rich scarlet figs.

Q. Is there any very large one?

A. Yes, called the Cubbeir Burr; it has 3,000 smaller ones, covering a space sufficient to shelter 7,000 persons!

Q. What are our best foreign wines made of, and from whence do they come?

A. They are made from grapes, and come from different parts of the continent. Red port, the wine chiefly drunk in England, comes from the neighbourhood of Oporto, in Portugal, and takes its name from that place.

Q. Is there white port?

A. Yes; and it was much drunk at one time, but now it is but little thought of: Lisbon, another pleasant white wine, comes also from Portugal.

Q. Do wines take their colour from the grapes of which they are made?

A. No; principally from the skins being pressed with them, or taken out.

Q. What wines have we from Spain?

A. Sherry, from the neighbourhood of Xeres; from about Cadiz we have Tent, which is made from the juice of a particular grape, that is not gathered till it has been perfectly ripe some time.

Q. Can you name some of the French wines?

A. Burgundy, which comes from the province of that name; claret, a thin, highly-flavoured red wine, much drank here; it comes from the vicinity of Bourdeaux; and the highly-prized Champagn

Q. Are there two sorts of this wine?

A. Yes; the sparkling champagne, which is bottled before the fermentation has ceased; and the still, bottled after it is over. The sweet white wines, Frontignac and Muscadel, come from Languedoc.

Q. What are the Italian wines?

A. There is but one good Italian wine, which is called Lachryma Chrysti, from the vineyards on Mount Vesuvius; but there were some there formerly which were much prized.

Q. Which are the principal German and Hungarian wines?

A. Tokay, Hock, Rhenish, and Moselle.

Q. Whence have we Madeira and Teneriffe.

A. From Madeira and the Canary Islands: the once-famed Canary sack is now called Malmsey Madeira.

Q. What Prince was drowned in a butt of Malmsey wine?

A. The Duke of Clarence, brother to Edward the Fourth.

Q. What is Mountain wine?

A. A luscious Spanish white wine

made from the ripe grapes which grow on the mountains around Malaga.

Q. Where is Malaga?

A. In Grenada, in the South of Spain; it has a magnificent cathedral, built by Philip II., while consort of Mary of England.

Q. Where do Cape wines come from?

A. From the Cape of Good Hope: the grapes which produce the red and white Constantia, will only grow on one particular farm.

Q. What is verjuice?

A. The very sour juice of unripe grapes; also, of the apples from our crab tree.

Q. What are raisins?

A. Dried grapes: and grocers' currants are a small grape without stones, usually red or black, which, when fresh gathered, are extremely delicious.

Q. Where do they grow?

A. In the Grecian Archipelago, particularly on the islands of Zante and Cephalonia: they were brought anciently from Corinth, and called 'corinths,' now corrupted to currants.

Q. Where do oranges come from?

A. They came first from Asia, and are the fruit of a low branching evergreen tree: the principal varieties are sweet or China, bitter or Seville; the former are eaten ripe, the latter prepared in various ways.

Q. Where do the best come from?

A. From St. Michael's, one of the Azores.

Q. What is made from the flowers?

A. An essential oil, nearly as much esteemed as attar of roses.

Q. What is attar of roses?

A. The attar ghul, or otto of roses, is formed by exposing to the night air, the newly-distilled water of the evergreen rose and musk rose. It is imported from the East Indies and Barbary.

Q. What is bergamot?

A. A well-known perfume, produced, at first, casually, by an Italian grafting a citron on a stock of a bergamot pear tree, whence the fruit produced by this union participated both of the citron tree and the pear tree.

Q. What is the shaddock?

A. The shaddock was so named after the captain who first brought it into the

West Indies from China. It is very large, is inferior in flavour to the orange, but keeps longer, and is, therefore, a useful fruit on sea voyages.

Q. What is the lemon?

A. The lemon, citron, and lime, are different varieties of the fruit of a small evergreen shrub, imported from Asia into the Southern parts of Europe.

Q. What is salt of lemons?

A. A very poisonous preparation from the juice of wood sorrel, a low acid plant which grows wild in our woods.

Q. What are tamarinds?

A. The pulp of seeds produced by the pods of a large tree which grows in the East and West Indies, America, and many parts of Asia.

Q. How are they sent to us?

A. Those from the East Indies come preserved with sugar, in casks, those from the West, which are considered the best, without any addition.

Q. What are guavas?

A. A delicious West Indian fruit, equally as wholesome as the tamarind, much prized in its raw state where it grows, but we generally see it as a jelly.

Q. Where do almonds come from?

A. France, Spain, Italy, and the Levant.

Q. What are bitter almonds?

A. The produce of a tree similar in appearance to the sweet almond, with an intense bitter and exquisite flavour: the deadly poison called Prussic acid is obtained from them by distillation

Q. Where do figs come from?

A. The south of Europe and some parts of Asia, and appear to have been an object of attention from the earliest times.

Q. How are figs preserved?

A. They are left on the tree till fully ripe, which is known by a drop of sweet liquid hanging from them. They are then gathered and placed on wicker hurdles, in a dry airy shed, and in the hottest part of the day remain in the air exposed to the sun. In the south of France they are dipped in lye, made from the ashes of the branches of the fig-tree, the use of the lye being to harden their skins.

Q. What is remarkable about the fig tree?

A. Its fruitfulness, and the fact that the fruit always precedes the leaves.

Q. What are pomegranates?

A. An apple-shaped fruit, with a thick rind, and pleasant juice or pulp, slightly astringent.

Q. What are cereal grasses?

A. The plants which supply corn are so called by botanists; they are wheat, rye, barley, oats, and maize or Indian corn.

Q. Why is wheat the most valuable?

A. Because its grain, when ground, affords by far the greatest quantity of flour, and this flour makes the most nourishing bread.

Q. What is starch?

A. Wheat steeped in water and exposed to the sun; it is then beaten, and produces a sediment which, when dried, is starch.

Q. What is bran?

A. The husk of wheat, separated from the flour by brushing the latter through a fine sieve.

Q. What is wheat straw used for?

A. For thatching, making beds for horses and cows; and for making bonnets.

Q. What are the best kind of bonnets?

A. Dunstable bonnets.

Q. Why?

A. Because they are made from straw grown on the neighbouring chalk hills.

Q. What are Leghorn bonnets made of?

A. A very fine-stalked wheat; it is cut green, and bleached by laying it for a long time in the river Arno, which has a gravelly bottom.

Q. What is semolina?

A. A nutritive substance, formed by a peculiar process, from wheat.

Q. What is macaroni?

A. A preparation of the finest wheat flour, mixed with eggs and other glutinous substances.

Q. Where does it come from?

A. From Italy, Sicily, and Germany, where it is eaten with milk; we use it in soups and puddings, and serve it up with grated cheese.

Q. What is vermicelli?

A. A composition of flour, eggs, cheese, and some other things, much used in Italy in soups, &c.; it is made as fine as bobbin.

Q. What is malt?

A. Barley which has been steeped in water for two or three days, till the shoots of the leaves begin to sprout, when their farther growth is prevented by being dried in a kiln.

Q. What effect has this on the grain?

A. It makes it mellow and sweet; it is then crushed in a mill, and its saccharine or sweet qualities are easily extracted.

Q. For what is malt chiefly used?

A. To make beer.

Q. How are the qualities of the malt extracted?

A. By pouring boiling water upon it; this is called mashing: the liquor when drawn off is called sweetwort.

Q. What is done with this wort?

A. Hops are put to it to give it a bitter flavour, and keep it in a state fit for drinking, and it is boiled again.

Q. Is this all that is done?

A. No; it is drawn off and left to cool, then yeast or barm is put to it, to assist the fermentation; after which it becomes beer, or ale, and is put into casks, or barrels.

Q. What is fermentation?

A. That change which takes place spontaneous in all vegetable bodies as soon as they cease to live.

Q. What is the difference between fermentation and effervescence?

A. Effervescence is applicable to mineral bodies, and is produced by a mixture of substances.

Q. What is yeast, or barm?

A. The froth rising on beer during fermentation.

Q. What is pearl barley?

A. The heart or best part of the barley, which is a round grain of pearly whiteness.

Q. What are hops?

A. The dried flower-buds of a climbing British plant.

Q. Have hops been long used in England?

A. No; though they grow wild here in great abundance, it is thought their use was first made known from the continent in the reign of Henry VIII.

Q. What caused the invention of porter?

A. Before the year 1730, the malt

liquors generally used in London were ale, beer, and twopenny, the last a weak kind of beer; and it was customary to call for a pint or tankard of half and half.

Q. But was not that rather troublesome?

A. Yes; but much less so than the practice of calling for three-threads, when the publican had to go to three casks to fill the measure.

Q. How did porter remedy this inconvenience?

A. Because it was made to unite all these three flavours, and was thence called entire, or entire-butt.

Q. How did it acquire its present name?

A. Because it was much drunk by porters and other working people.

Q. Where is rye supposed to have come from?

A. From the island of Crete.

Q. How is it used?

A. Formerly for bread, either alone or mixed with wheat, and now for the distillation of spirits.

Q. Is the straw useful?

A. Yes, to brickmakers and horse-

collar manufacturers, and is excellent for thatching barns and cottages.

Q. Who invented a manufacture of rye straw to imitate Leghorn bonnets?

A. Mr. Cobbett. And it succeeded so well, that it is difficult to distinguish the one from the other.

Q. What are oats chiefly used for?

A. For feeding horses, and also for making oatmeal, and this is used for making oat-cake, gruel, &c.

Q. Where is maize or Indian corn chiefly grown?

A. In America; it seldom ripens in England.

Q. Are all these grains properly in the class of grasses?

A. They are, as by grasses we understand all plants which have a long hollow, jointed stem, a husky calyx, and the seed single.

Q. Can you describe a few of the most particular?

A. There is cotton grass, so common in the north, or marshy land, that the ground appears covered with snow.

Q. Can this cotton be made useful?

A. Not by itself, without undergoing

a slight chemical process, it is so brittle; but mixed with wool or Indian cotton, it can be spun into a strong even yarn.

Q. Is the bullrush such a grass?

A. It is, and being of a soft pliant texture, without roughness, it is sometimes used to make mats, thatch cottages, and stuff pack-saddles.

Q. Are the rush bottoms of chairs made of it?

A. They are.

Q. What kind of grass makes the best hay?

A. Meadow fox-tail grass, for it grows freely in moist and fertile pastures and meadows, and possesses in a greater degree than any other, the three requisites—quantity, quality, and early growth. It is a native of Britain and most parts of Europe,

Q. Where is that called Timothy grass, or meadow cat's-tail, much cultivated?

A. In North America; and though coarse and hard, it is very productive and useful, growing sometimes three or four feet high, and as thick as wheat straw.

Q. Do horses like it?

A. Yes; but it is not a very good hay-grass on account of the wiryness of its stem; but it may be cut two or three times in a season, and is very productive, especially in the early spring.

Q. Is fiorin, or Orcheston long grass, a troublesome weed?

A. Yes; it is known by the name of black squitch, or bent; but it is a good grass for green winter fodder: it grows on wet soils.

Q. What is the meadow soft grass, or Yorkshire white grass?

A. A grass good for sheep, but not for horses or cattle.

Q. What do the inhabitants of Rasa, in the Hebrides, make of mountain melick grass?

A. Ropes for fishing-nets, which are very durable.

Q. Is the rough-stalked meadow grass one of the superior grasses?

A. Yes; it forms a part of our richest meadows: it is nutritive, and greatly relished by pasturing animals.

Q. What is the rough cock's-foot?

A. A coarse but very nutritive grass,

of early and rapid growth. Although a native of Britain, its seeds were introduced from Virginia about 1780.

Q. Is there any grass which will grow well on dry ground?

A. Yes; the smooth-stalked meadow-grass flourishes on the driest soils, on dry banks: it is frequently found green on high pastures, when almost every other grass is withered.

Q. Which is the earliest grass we grow?

A. Italian rye-grass, excellent pasture for sheep: it is generally foot high in January.

Q. What is clover?

A. There are several kinds of clover, or trefoil; the white-creeping, or Dutch clover, makes good fodder for cattle: no plant known in the agriculture of Europe is so generally capable of cultivation.

Q. For what is the red clover best suited?

A. When it is intended to keep the land one year only in forage or herbage, there is no species of trefoil which has been found equal to the red clover for largeness of return and early maturity.

Q. Is the common reed useful?

A. Yes; for screens to shelter tender plants, and sometimes for chair bottoms; it is also used for thatching roofs of houses.

Q. What is sea mat-weed?

A. A very common, useful plant on most of our sea shores: its spreading roots give stability to the loose sand, and thus preserve it against the encroachments of the sea. Several acts of parliament have been passed for its encouragement.

Q. What is teazel?

A. A plant with crooked scales on an egg-shaped head, of great importance in the cloth-making counties of England, to raise the knap of woollen cloths.

Q. How are these heads generally prepared?

A. The flowers appear in July, and decay in August, when the heads are cut off and exposed to the sun till perfectly dry.

Q. How are they used?

A. Either set into flat boards, like cards, and used by the hand, or fixed round a large wheel, when the cloth is pressed against them.

Q. Is the potatoe an English plant?

A. No; it was introduced here in the sixteenth century, by Sir Walter Raleigh, by whom it was brought from America.

Q. How long was it before potatoes were much cultivated near London?

A. Forty years, and then they were thought rarities: it was not then known how useful they are as common food.

Q. How are they planted?

A. They are generally cut into as many pieces as there are eyes in them; that is, little knobs, from which a shoot would spring.

Q. What are yams?

A. An American root of irregular shape, and sometimes growing to the weight of fifty pounds and upwards.

Q. How are they eaten?

A. As potatoes, either roasted or boiled; sometimes made into flour for bread or puddings: they are palatable and nutritious.

Q. What is beet?

A. A fleshy or succulent root, which grows wild in several of the southern counties of Europe, and is cultivated in our kitchen gardens.

Q. How is it eaten?

A. In salads, boiled and cut in slices, as a pickle, or stewed with onions.

Q. What is mangel wurzel?

A. A root of the same tribe as the beet; but it is unpalatable and insipid; and is much used for feeding cattle. It is also used for producing, by fermentation, a liquor from which alcohol is distilled.

Q. What is asparagus?

A. A plant which requires a good deal of care in the cultivation, and is cut when about three or four inches high, by slipping a sharp knife down by the side of the plant, and sloping it upward, that other plants may not be injured.

Q. What are carrots?

A. Another plant which shews the power of cultivation; it is a sweet, tender root, growing fifteen to eighteen inches long in the eatable part.

Q. When were carrots introduced into England?

A. In the reign of Elizabeth.

Q. What are parsnips?

A. A vegetable something like carrots, and cultivated in the same manner.

Q. What are turnips?

A. Another edible, or eatable root, cultivated to a great extent in almost every part of England.

Q. Is it only the root which is eaten?

A. The young leaves are sometimes boiled as greens, and called turnip tops; both leaves and roots are eaten by sheep.

Q. Is there a kind called Swedish turnips?

A. Yes; but they are of a distinct species, generally of a yellowish colour, and so hardy as to resist the most intense frost.

Q. Are they very good food for sheep?

A. Yes; but they are so compact and firm, as sometimes to break their teeth.

Q. For what purpose are they cultivated on the Continent?

A. For the sake of the oil called Colza, which is extracted from them.

Q. To what tribe does the rape belong?

A. It, like the turnip, is a variety of the cabbage tribe, and is grown for oil.

Q. Is it of any other use?

A. Yes; the cake formed from the residue of the seeds and husks, is used in

some parts to feed cows and pigs, and for other purposes. When other fodder is scarce, its stem and leaves are very useful as food for sheep.

Q. What is the effect of cultivation upon the cabbage?

A. In the wild plants the leaves are expanded; whilst those in the garden are set so close as to lie upon each other almost as the scales of a bulb.

Q. When was the cabbage brought to England?

A. It is said to have been brought by the Romans, yet the original stock grows wild on cliffs by the sea-side, in Kent and Cornwall.

Q. Is this wild cabbage the original of some other vegetables?

A. Yes, of colewort, borecole, cauliflower, brocoli, and many other varieties.

Q. Was the cabbage much prized by the Romans?

A. Indeed it was; they called it Brassica, and Pliny gives many directions for its proper cultivation.

Q. What favourite dish do the Germans make of the cabbage?

A. Sauer Kraut. The cabbages are

cut fine, pressed into a cask with alternate layers of salt, and left to ferment.

Q. When was the artichoke first grown in England?

A. It was imported from the south of Europe in 1580.

Q. What part of the artichoke is eaten?

A. The receptacle, that is to say, the part the flower grows upon, and a fleshy substance on the scales of the calyx.

Q. What is the choke?

A. The unopened flower buds, and the bristles which separate them from each other.

Q. Do we eat the same part of the Jerusalem artichoke?

A. No, but the potatoe-shaped root. This productive plant requires neither particular soil, nor care, and is good food for hogs and store pigs.

Q. May it be given to horses?

A. Yes, if washed, cut, and ground. The roots should be dug up from September till November, and kept in sand, or under cover.

Q. What are cardoons?

A. A species of artichoke which grows wild in the south of France.

Q. Is the same part eaten as of our artichokes?

A. No, the root, stalk, and middle rib of the leaves; these are blanched to take off the bitterness, and then they are either eaten alone, or as sauce.

Q. Where are peas thought to have come from?

A. Egypt, Syria, and the south of Europe: they grow in abundance in Japan.

Q. Were peas known in Scotland, before they were grown in England?

A. Yes, for in 1299, some English forces besieging a castle in Lothian, lived on peas and beans, which were growing in the fields; yet, Fuller says, they were brought from Holland in the reign of Elizabeth, and were considered a dainty.

Q. Who are supposed to have introduced beans?

A. The Romans. Kidney beans were cultivated nearly through every part of

both the eastern and western hemisphere. The French cook the ripe seeds, and call them haricots.

Q. What is fricolli?

A. A variety of the kidney bean.

Q. What are vetches?

A. A small kind of beans which grow wild; but are cultivated in many parts of England, principally as food for cattle. Pigeons are exceedingly fond of them.

Q. Where are lentils much used?

A. In Egypt and Western Asia.

Q. How are they prepared?

A. They are threshed, winnowed, and cleansed like corn. Dr. Shaw says they dissolve easily in water, boiling into a mass, and forming a pottage of a red, or chocolate colour.

Q. Is rice-paper made from a plant of the pea and bean tribe (Leguminosæ)?

A. Yes; it is made from the pith of a leguminous plant, which is moistened and placed under a heavy weight to press it smooth.

Q. Where is it chiefly made?

A. At Canton, in China; but it grows wild also in the East Indies; and the Hin-

doos used to make light hats of it, and tie bundles of its twigs together and use them as a raft.

Q. Is there a fine cucumber called the Egyptian melon?

A. Yes; or queen of cucumbers: the flesh is sweet and cool, though not so cool as the water melon.

Q. What is the snake cucumber?

A. A delicious fruit from the East Indies: it is cylindrical and oblong, about the size of a large pear.

Q. How do we eat our common cucumbers?

A. Always before they are ripe, and generally cut in slices, with vinegar, oil, pepper, and salt.

Q. What are gherkins?

A. Young cucumbers, which are either pickled or preserved; the cucumber is said to have been introduced into England about 300 years ago.

Q. What is the colocynth so much used in medicine?

A. The dried pulp of a kind of cucumber called the bitter apple.

Q. Are melons a species of cucumber?

A. Yes; and it is one of the coolest

and most delicious fruits we have; Linnæus says it is a native of Tartary; many of our best melons come from Persia; it is most valuable in all its varieties in hot climates.

Q. How are melons cultivated in Cashmere?

A. The melon-growers get two or three hurdles together; they then cover the hurdle with grass and weeds, and let them float on the surface of the water, and as soon as the grass and weeds begin to decay and form a kind of soil, they sow cucumber and melon seeds on it.

Q. What is the pumpkin, or pompion?

A. A species of gourd which grows to an enormous size: it is cultivated in Germany, and used as food for many animals.

Q. Does it require much trouble?

A. No; it will flourish on any tolerable soil, and in a warm sheltered situation.

Q. Is it eaten at table?

A. Yes, in various forms; particularly in pies, puddings, and pancakes.

Q. Are mushrooms dangerous and unwholesome?

A. They are; for the true mushroom

is leathery and indigestible: if they grow under trees, they are poisonous; and other unwholesome plants are frequently mistaken for them.

Q. What is their chief use?

A. To make ketchup: they are often pickled, and frequently eaten fresh, either stewed or broiled.

Q. Can they be reared artificially?

A. Yes, in a cellar; as they will grow without light; but these are not so good as those which come from the open fields.

Q. Is there a species of mushroom which grows on the grass circles called fairy rings?

A. Yes; they are thought by many persons to be the champignons of the French cooks.

Q. What are morells?

A. A kind of fungus, with a naked wrinkled stem, and an egg-shaped head, full of cells on the outside.

Q. How are these used?

A. When dried, they are put into sauces and soups to flavour and thicken them; but they are very unwholesome if they have been gathered after days of wet weather.

Q. What are truffles?

A. A solid round rough fungus, without a root, which grows four or five inches under the ground, from the size of a pea to that of a good-sized potatoe.

Q. How are they found?

A. Dogs are taught to search for them in England; but in Italy they have pigs for this purpose.

Q. How are they eaten?

A. Either roasted fresh, or cut in slices and dried, to put into soups and sauces.

Q. In what part of England do they grow most?

A. In Wiltshire, Hampshire, and Kent; but these seldom weigh more than four or five ounces, whilst those on the continent will weigh fourteen or fifteen.

Q. What is camomile?

A. A well-known plant with a daisy-like flower, often used in poultices and fomentations.

Q. Is there anything peculiar in the smell?

A. Yes; it is so fragrant that the place where it grows may easily be discovered, by the strawberry-like smell of its leaves.

Q. Is it sometimes given as an infusion?

A. Yes; and sometimes substituted for Peruvian bark.

Q. What is Peruvian bark?

A. A most valuable medicine; the produce of various trees, called Cinchona, which grow naturally in South America, but more particularly in Peru.

Q. What are these trees like?

A. Something like a cherry tree, and bear clusters of red flowers.

Q. Why did they call it Jesuit's bark?

A. From having been first introduced into Europe by monks of that order.

Q. In what does its medicinal properties consist?

A. In a substance, called quinine, which, as an alkaline salt, combined with sulphuric acid, is now called sulphate of quinine, and given in cases of debility.

Q. What is ipecacuanha?

A. The root of a little creeping half herbaceous plant, found in damp shady forests in Brazil.

Q. Is the strawberry a native of England?

A. So it is supposed, as it grows wild

in our woods, and is found, together with the raspberry and red whortleberry, on the very borders of the arctic zone.

Q. Does the raspberry grow wild in England?

A. Yes, in many parts of it; it is of the same tribe as our wild hedge fruit, the blackberry.

Q. Why is it called a travelling plant?

A. Because the same stalks do not produce fruit above three or four years in succession, but before the stalks die they send up others beside them to supply their place: these are taken up by the gardeners to make a fresh plantation.

Q. Is the cherry a native of Europe?

A. Yes, and so is the plum; but the finest kinds of both seem to have been brought from Asia.

Q. What is the sloe?

A. A kind of plum, nearly black, and proverbial for its harshness; the juice, mixed with green vitriol, makes an indelible fluid, either for dyeing, or writing.

Q. What other wild plum have we?

A. The bullace.

Q. What is the apricot?

A. A fruit of the plum tribe: the tree is a native of Armenia and other eastern nations, and was introduced into England by the Romans.

Q. Where is Armenia?

A. A country in Asia, divided into Major and Minor. Greater Armenia is now called Turcomania.

Q. Where was the peach brought from?

A. Originally from Persia into Europe, and brought to England about 1562. It has gradually become used to this climate: when first known it could only be raised in hot-houses.

Q. What is the nectarine?

A. A smaller, smooth-skinned, and very delicious variety of the peach.

Q. Is the gooseberry a native?

A. It is thought to be so; if not, it has been long naturalized here, and does not thrive better in any other situation. It also grows wild in France, Germany, and Switzerland.

Q. What is the barberry?

A. A shrub, with beautiful red, ob-

long-shaped berries, which hang in clusters, and so acid that even birds will not touch them.

Q. What curious fact is related about the barberry?

A. That it may be poisoned like a living being: if the water in which poppy-heads have been boiled is put to the roots of the barberry, the stamens will become flaccid, and seem stupified and insensible.

Q. Are there many varieties of currants?

A. Yes; besides the common kind of red currant, of which the white and pale pink are only varieties, there is the tree currant, which grows wild in England, and bears its fruit on an upright spike; the creeping currant, which grows wild in Canada, and creeps along the ground like ivy.

Q. Has the black currant always been esteemed as a fruit?

A. No; about 200 years ago, Gerard, who wrote a book on plants, spoke of it as uneatable and loathsome.

Q. Are cranberries natives?

A. Yes; they are of the same species

as the whortleberries, and they grow in peaty bogs, in the north of England.

Q. How do they grow?

A. Each on its own little wiry stalk: the best is a grey berry with dark spots.

Q. Do they grow elsewhere?

A. Yes, in Russia and America; and these are larger than ours, but have not so fine a flavour; they grow in Sweden also, but are there only used for cleaning plate.

Q. How do we get our fine apples, as you say only the crab grows wild here?

A. By grafting any valuable sort upon a crab-stock or stem.

Q. What is grafting?

A. Inserting a young shoot, of the kind you wish, under the bark of the crab.

Q. Are apples very useful?

A. Yes; some kinds are eaten, as the pippins; others are cooked, as the codlins, russets, northern greenings, &c.

Q. Is cider made from apples?

A. Yes; the golden pippin and the redstreak are considered the best for that purpose.

Q. How is cider made?

A. The apples are sorted according to their ripeness, then ground in a mill and let stand a day or two.

Q. What then?

A. The juice is pressed through hair cloths of different degrees of fineness and put into casks, then changed into other casks, which, when the fermentation has ceased, are closed down.

Q. What is perry?

A. The juice of pears, made much in the same manner as cider; but it is not so acid.

Q. Do pears grow wild in England?

A. Yes, in Somersetshire and Sussex. A great variety is also cultivated for dessert.

Q. Where is perry principally made?

A. In Herefordshire and Worcestershire: those pears called the squash, the oldfield, and the barland, are esteemed the best for it.

Q. What are medlars?

A. A fruit growing on rather a large tree, considered to be English, as it has been remarked more than 150 years ago growing wild in hedges in Minshull, in Cheshire.

Q. Is it a pleasant fruit?

A. Not till partly decayed.

Q. What is the quince?

A. A somewhat pear-shaped fruit, believed to have come from the isle of Crete.

Q. Is it eatable?

A. Scarcely, whilst raw; but they are very pleasant when cooked, preserved, or made into marmalade; and yield an agreeable wine.

Q. Where do they grow wild?

A. On the borders of the Danube.

Q. What are mangoes?

A. The fruit of an East Indian tree, now cultivated in most tropical regions.

Q. What description of tree is it?

A. Of the sumach tribe, growing thirty or forty feet high, and very productive: the fruit is kidney-shaped, with a flattened stone, and of a delicious flavour.

Q. Is there a tree called the tallow-tree?

A. Yes; it is a native of China, and its fruit consists of three round white kernels enclosed in a husk.

Q. How are these used?

A. They are melted with a little oil,

and then wicks are made of light, dry wood, with the pith of a rush turned round them.

Q. What was first used as paper?

A. A rush, or reed,—the Egyptian papyrus: and from this came the name of paper.

Q. What is frankincense?

A. A gum resin, which distils from incisions made in a tree, somewhat resembling the sumach, and belonging to the same natural family, inhabiting the mountains of India. The common frankincense is the production of the spruce fir.

Q. What is myrrh?

A. A fragrant, bitter, aromatic gum-resin, from a tree that grows in Egypt and Arabia, called Balsamodendron Myrrha.

Q. What are its qualities?

A. Good myrrh is of a turbid black red colour, solid and heavy, of a peculiar smell, and bitter taste: it dissolves almost totally in boiling-water; but, as the liquor cools, the resinous matter subsides: it is very valuable in medicine.

Q. What are balsams?

A. Oily substances flowing from seve-

ral plants of the turpentine species: balsams are either solid or liquid; of the former are the balsam of copaiva, the balsam of tolu, the balsam of Peru; of the latter, benzoin, dragon's blood, and storax.

Q. What is benzoin?

A. A dry resin of a fragrant smell; it comes from the styrax, an Indian tree, and is the chief ingredient in the manufacture of court plaster.

Q. What is quassia?

A. The root of a tree which grows in the West Indies and South America, particularly in Surinam: it is exceedingly bitter.

Q. How is it employed?

A. Principally as a medicine: it was first used as a secret remedy in malignant fevers, by a negro called Quassia, from whom it takes its name.

Q. Is mint a native English plant?

A. Yes; there are several kinds, two in particular; one called peppermint is the strongest and most aromatic, and is, therefore, most used in medicine: it yields an essential oil, and peppermint-water is distilled from it: the other is

called spear-mint, it is milder and more used in cooking.

Q. What is mustard?

A. The seeds of a plant which grows wild in many parts of England, but the best is cultivated near Durham; and though their pungent taste, when ground and mixed with vinegar or water, is well known, yet they yield an oil which is both soft and insipid.

Q. What is horse-radish?

A. A plant which grows wild, and is also much cultivated throughout England. The root is scraped and eaten with meat and fish; it is very pungent.

Q. Can you tell me why the sheep, goat, cow, deer, camel, and llama are called ruminating animals?

A. Because they bring the food which they have swallowed, again to the mouth, to be rechewed.

Q. Have they more than one stomach?

A. Yes, they have four; the food passes into the first two before it is rechewed, and afterwards into the third and fourth.

Q. What do we procure from the sheep?

A. Its flesh furnishes us with mutton; its wool with clothing; its skin with parchment and leather; its entrails, when properly prepared, with strings for musical instruments; and its bones, when calcined, form materials for tests for the refiner.

Q. Where are goats found?

A. In almost every part of the globe, bearing the extremes of heat and cold, and differing in size and form according to circumstances: the flesh of the young goat, or kid, is esteemed superior to lamb.

Q. Is the goat's milk as good as the cows?

A. It is considered both thicker and richer in flavour; and on ship board the goat is particularly valuable, as it thrives there better than any other animal.

Q. Is their wool useful?

A. Not so much as that of the sheep; but there is a fine soft wool at the root of their long coarse hair. Camlets are made from the wool of the Angora goat; and the celebrated Cashmere shawls from that of the Cashmere goat. The fat makes better candles than that of the sheep or ox.

Q. Is their skin useful?

A. Yes, they take the best dye for morocco leather; the skin of the kid is used for ladies' gloves and shoes.

Q. Why was that leather called morocco?

A. Because we had it first from the kingdom of Morocco, in Africa.

Q. Is the cow a very valuable animal?

A. Yes; the skin, the horns, the bones, the blood, the hair, have all their separate uses.

Q. Are not the horns of cows very useful?

A. Yes; as they are soft, tough, semi-transparent, and capable of being cut into a variety of forms, such as combs, knife-handles, lanterns, and many other articles.

Q. But do not horns seem too hard to be easily cut into those shapes?

A. No; to soften them sufficiently they are held in the flame of a wood fire, when they become nearly as soft as leather, and are then split open, pressed, and otherwise prepared.

Q. How is horn stained to look like tortoise-shell?

A. A paste is spread over it, made of

two parts quick lime, and one of litharge, mixed with soap ley.

Q. What is litharge?

A. An oxide of lead, not quite vitrified, or turned into glass.

Q. Is the skin of any use?

A. Yes, for making strong leather; and the hair is mixed with mortar to make it hold together.

Q. What is the flesh of the cow called when killed?

A. Beef; and that of the young cow, or calf, is called veal.

Q. What else is useful about the cow?

A. She gives us milk, which is drank, or made into cheese; it is also used in puddings, and for a great many other useful purposes; likewise butter, which is made from cream.

Q. What is cream?

A. The richest and lightest part of milk; it rises to the top when the milk has stood a few hours.

Q. How is butter made?

A. By churning the cream; that is, shaking it till the oily particles adhere, and leave the milky ones.

Q. Is this the only method?

A. No, sometimes heat is employed, as in Devónshire; and in some places the cream is buried.

Q. How did the Romans use butter?

A. Only as a medicine; never as food.

Q. What is butter called in India?

A. Ghee; it is there principally made from the cream of the buffalo.

Q. How is cheese made?

A. The milk is curdled by a substance called rennet, which is prepared by salting the inner membrane of a calf's stomach; the curds are pressed together to form the cheese, and the thin which runs out is called whey.

Q. Which is the best English cheese?

A. Stilton, made from the rich pastures of Huntingdonshire, Leicestershire, Rutland, and Northamptonshire.

Q. Is not Cheshire famous for its cheese?

A. Yes; and in Wiltshire and Gloucestershire much is made which is very excellent.

Q. Which is considered the best foreign cheese?

A. Parmasan, which we receive from

various parts of Italy: this is made of goat's milk, or a mixture with that and the cow's.

Q. What is there peculiar in the Dutch cheese?

A. That it is made with spirit of vitriol instead of rennet, which gives it a sharp saline taste, and it is said, mites will not eat it.

Q. What gives such a peculiar flavour to the green Swiss cheese?

A. The fragrant powder of melilot.

Q. What animal supplies the place of the horse, cow, and sheep to the Laplanders?

A. The rein-deer, which will travel a hundred miles a-day, harnessed to a sledge.

Q. What is a sledge?

A. An extremely light carriage, shaped something like a boat, round at the bottom, without wheels, and having an upright board to lean against, whilst the driver guides them over the snow.

Q. Do not many accidents happen?

A. No; the missionary, Leems, only heard of one which was fatal, during a residence of ten years.

Q. Of what other use are they?

A. The milk makes both butter and cheese, and the mountain Laplander lives all the winter upon their flesh, whilst their skin gives him garments, and coverings for tents, sledges, and beds; the horns and bones are used as handles for instruments, and the sinews of the legs make thread and cord.

Q. Do the horns of the deer fall off annually?

A. Yes; and are again renewed larger than the preceding year.

Q. From what animal is musk procured?

A. From the musk-deer, which inhabits a large part of central Asia.

Q. Where is the musk contained?

A. In a small pouch at the under part of the body: it is used in medicine, and has a most powerful odour.

Q. What nation completely subdued and domesticated the llama?

A. The ancient Peruvians: to them it answered the same purposes as the camel and dromedary of the old continent: it even exceeds the camel in its abstinence and endurance of thirst.

Q. Is the fleece of the wild llama valuable?

A. Yes; it is longer than that of the domesticated animal, and is much in request for the manufacture of woollen cloths of a delicate texture.

Q. Are camels and dromedaries different species of animals?

A. No, they are the same kind; but the dromedary is of a higher breed, and has only one hump; the camel has two.

Q. In what countries are they found?

A. The native country of this genus is said to extend from Manistania to China, within a zone of 1000 miles in breadth; the Arabian camel or dromedary is found throughout the length of this zone, on its southern side, as far as Africa and India.

Q. What is the hump?

A. A fleshy substance, which gradually wastes when the animal is in want of food. The Arabs examine the hump before they start on a journey, to ascertain whether the animal is in a proper condition for travelling.

Q. Are camels as gentle as they are represented to be?

A. No; they are very quarrelsome, and apt to fight, biting and lacerating each other's ears.

Q. Are they easily guided?

A. Not always; indeed they are sometimes so unruly, they will not enter the gates of a town, but are obliged to be unloaded, and the goods taken in on asses.

Q. Are they useful?

A. Highly so; and form the only means by which the inhabitants of the sandy deserts could travel or convey merchandise.

Q. What qualifies them so much for this purpose?

A. Their broad, tough, spongy feet, and their being able to bear the want of food and water longer than any other animal, from the peculiar construction of the stomach.

Q. Is their hair useful?

A. Yes; it falls off every year, and is so soft and fine, as to be woven into shawls and other fabrics: leather is made of the skin.

Q. Is their milk drank?

A. Yes; it is a most important article of nourishment in Arabia.

Q. What are the names of some animals of the equine race?

A. The horse, ass, mule, and zebra.

Q. What is their distinguishing characteristic?

A. Solid or undivided hoofs.

Q. What country produces the finest breed of horses?

A. Arabia; but an opinion prevails that Egypt is the original country of the horse.

Q. Is the horse herbivorous?

A. Yes; and is more scrupulous in the choice of his food than most other domestic quadrupeds.

Q. How is the height of a horse calculated?

A. By hands: a hand is four inches.

Q. Is the skin useful?

A. Yes; it is tanned for leather.

Q. What is done with the hair?

A. It is woven for covers for chairs and sofas, for sieves, fishing lines, and bows for musical instruments: mattresses, &c., are stuffed with inferior hair. It is made elastic by being baked.

Q. Is the ass a very different animal in Spain to what it is with us?

A. Yes; it is there a very elegant, tractable, and valuable being, more hardy than the horse. They are also preferred by Musselmen pilgrims on their toilsome journeys to Mecca.

Q. Is their milk given to sick persons?

A. Yes; because it is light and easily digested.

Q. What is made of the skin?

A. Shoes, heads of drums, and throughout Persia, there are manufactories of sagri, or shagreen, made of it; the roughness is effected by embedding some seeds in it whilst soft.

Q. Are the leaves of pocket-books sometimes made of it?

A. Yes, when prepared in a particular manner.

Q. What are mules?

A. Animals between the horse and the ass, larger and stronger than the latter, and not so large as the former; very sure-footed, and much employed abroad in crossing mountains.

Q. Where are the finest mules found?

A. In Spain; but Savoy produces very large ones.

Q. How many kinds of zebra are there in South Africa?

A. Two; the common zebra, and that designated Burchell's zebra.

Q. Is the zebra a gregarious animal?

A. Yes; herds graze together, with a sentinel posted on some adjacent crag, ready to give the alarm in case of any suspicious approach.

Q. Does the horse belong to the order of Pachy demata, or thick skinned animals?

A. Yes; also the elephant, rhinoceros, hippopotamus, wild boar, hog, &c.

Q. What kind of animal is the elephant?

A. The only one known of its kind: besides the ivory tusks which project from the upper jaw, the nose is lengthened into a long and flexible trunk, with something at the end much resembling a finger, with which he can pick up a pin; whilst, with his trunk, he can root up a tree.

Q. Does he eat flesh?

A. No, he is herbivorous; that is, lives on herbs.

Q. How is he used in India?

A. Both for labour and riding on; it is calculated that one elephant will do the work of six horses.

Q. In what way is he generally ridden?

A. A carriage, called a howdah, is placed on his back for his master, and he is guided by a man seated on his neck with an iron rod in his hand, which is hooked at the end; with this he pricks him on, or turns him as he likes.

Q. Is he very intelligent?

A. Very, and much attached to those who are kind to him; but very resentful against those who injure him.

Q. What is made of his skin?

A. Strong and valuable leather.

Q. From what elephants do we get the best ivory?

A. Those from Ceylon; as it does not turn yellow.

Q. What is there peculiar in the skin of the rhinoceros?

A. That it is proof against the stroke of a cimeter.

Q. What size are the horns?

A. From twelve to fifteen inches in length; they are preferred by some persons to tortoiseshell.

Q. How are they fixed?

A. Only to the skin, and seem quite loose when the animal is quiet; but when he is angry, they become fixed and immoveable.

Q. Is he strong?

A. Extremely so; but very inoffensive if not irritated; he feeds on vegetables.

Q. What is the hippopotamus?

A. An African animal of immense size, called also the river-horse; his tusks are ivory, and never lose their colour; he feeds on vegetables, and is very timid.

Q. Why is he called the river-horse?

A. Because he is said to walk with ease at the bottom of rivers, only coming up about every ten minutes to breathe.

Q. Where do our pigs come from?

A. From the wild boar of the forests of France, Germany, and other parts of Europe.

Q. How are Westphalia hams made?

A. Principally from the wild boars which roam about the extensive moorlands in that province.

Q. What is brawn?

A. The flesh of the boar cured in a

particular manner, then rolled hard together without the bones, and boiled till quite tender.

Q. What is lard?

A. The fat of pigs boiled and poured into bladders.

Q. Is the skin of the pig useful?

A. Yes; it is used for making saddles: brushes are made of the bristles, and shoemakers use them instead of needles.

Q. Is the badger of the bear tribe?

A. Yes, and makes excellent hams and bacon; the skin is water proof, without any preparation, and the hair, or bristles, make painters' brushes.

Q. What do they live upon?

A. Vegetables; they are perfectly harmless, though very strong.

Q. What is the hedgehog?

A. An inoffensive little quadruped, found in most of the temperate parts of Europe and Asia; it is insectivorous, and a most harmless creature.

Q. Is it covered with spines, or prickles?

A. Yes; and when alarmed, it rolls

itself up like a ball, and few animals like to meddle with it.

Q. Is the common porcupine also covered with spines?

A. Yes, on the back; but these are much larger, marked with black and white rings.

Q. What do porcupines feed upon?

A. Vegetables principally, and are themselves excellent eating.

Q. Of what countries is it a native?

A. Of Africa, India, and the Indian Islands, and is also found in some of the warmer parts of Europe.

Q. Does it belong to the rodentia or gnawing animals?

A. Yes; also the hare, rabbit, squirrel, beaver, rat, &c.

Q. Did beavers ever live in England in a wild state?

A. They are supposed to have been found here formerly, and that their fur was the most valuable of any in the island.

Q. How do they live?

A. Always in communities, and in the neighbourhood of water.

Q. How do they build their habitations?

A. Half under and half out of the water; they cut down trees with their sharp teeth, and beat their work flat with their tails.

Q. What do they live upon?

A. Vegetables.

Q. Is any use made of the fur and skins?

A. Yes; hats, caps, gloves, &c., are made of the fur, and the skin is made into leather.

Q. Can you tell me anything of the habits of the marmotte or prairie dog?

A. They also live in communities; their villages, as they are called, sometimes being many miles in extent. Their habitations have sometimes two entrances, and their choice of abode seems determined by the presence of a short, crisp grass, which forms their sole nourishment.

Q. Do they sleep during the winter?

A. Yes; and previous to the cold weather setting in, stop up the doors of their habitations.

Q. Where are they found?

A. In North America.

Q. Is any bird frequently found a tenant of their habitations?

A. Yes, a small species of burrowing owl.

Q. Did not the ancient Britons object to eat the hare.

A. Yes; it was absolutely forbidden by the Druids, and abhorred by the natives for centuries after that order was abolished.

Q. Who were the Druids?

A. The priests of this island, who taught the people a dreadful superstition, offering human victims to their gods, and considering the oak and the mistletoe which grew upon it, sacred.

Q. Does the mistletoe grow on the ground?

A. No, only on the branches of trees.

Q. Is the rabbit a native of Britain?

A. Yes: the flesh is eaten, the fur is much used in making hats, and the skins are boiled down into size or glue.

Q. Are the skins ever dressed with the fur on?

A. Yes, sometimes, and make cheap and warm trimming for dresses.

Q. Do rabbits increase greatly?

A. Yes; and boys may be pleased to know, that the best food for tame ones is the shortest and sweetest hay that can be had: a load of it will keep 200 couple for a year.

Q. Have we many species of native dogs?

A. Yes, fourteen.

Q. Which are most useful to man, either British or foreign?

A. The shepherd's dog is rude and ill-looking: without one, the shepherd could not manage his flock, as he drives and keeps them together.

Q. How are bloodhounds used?

A. To trace wounded animals by their blood. There is an interesting account in the *Tales of a Grandfather*, of Robert Bruce having been tracked by a bloodhound.

Q. How did the ancient Britons use the mastiff?

A. They trained him to war: with us they are used as faithful watch-dogs.

Q. Which is the most faithful?

A. The spaniel.

Q. From what does the terrier derive its name?

A. From being chiefly employed underground, (terra being latin for the earth): rats, polecats, and foxes, are driven out of their holes by them.

Q. Is the Siberian dog useful?

A. Very; in many northern countries these dogs are employed in drawing sledges over the snow, and have been known to perform a journey of 270 miles in three days and a half.

Q. For what is the Newfoundland dog famed?

A. For its strong attachment, and power of swimming; numbers of persons have been saved by these dogs.

Q. Are there any dogs trained to search for persons lost in the snow?

A. Yes; by the monks of St. Bernard: they take provisions round their necks, and have even brought children to the convent on their backs.

Q. What kind of dog is the greyhound?

A. Very graceful in form, and highly prized by sportsmen for its swiftness in coursing, or hunting the hare.

Q. Is the wolf of the dog tribe?

A. He is; but as they attack both men and cattle, we may thank our first Edward for their destruction.

Q. How so?

A. When he came to the throne, wolves were so numerous in England, that he levied taxes to be paid in wolves' heads.

Q. Is the fox useful?

A. Yes; he destroys many troublesome animals. He is also noted for his cunning.

Q. What is the art of tanning?

A. Rendering the hides or skins of animals dense and waterproof, by means of tan.

Q. What is tan?

A. The bark of the oak or other trees, ground and macerated in a small quantity of water.

Q. How are the skins prepared?

A. They are cleansed from hair, wool, and the fleshy parts, by the help of lime, scraping, and other means, and then laid in tan-pits.

Q. Is this a very tedious process?

A. Yes; but the time is now shortened one-fourth by the use of a tanning machine.

Q. What is that?

A. A pair of horizontal rollers placed over the tan-pit, between which the hides are passed, the tannin squeezed out, and they are again let down into the pit, to receive a fresh supply.

Q. Is our domestic cat much valued?

A. Yes, in many places: the Turks respect it highly.

Q. Was it much regarded in ancient times?

A. Yes; the Egyptians considered it an object of sacred veneration, and punished those who killed one, even by accident.

Q. Is the lion of the cat tribe?

A. Yes; but distinguished from all others by its tawny colour, a long tail, bushy at the end, and by the presence of a full flowing mane in the male.

Q. Is the tiger of the same family?

A. Yes; as also the panther, the ounce, the leopard, and the lynx.

Q. How are they particularly distinguished from those of the dog tribe?

A. By having claws which can be drawn up within a sheath.

Q. What are some of the other characteristics of the feline race?

A. The under-surface of their feet is provided with elastic pads or cushions: their sight is most acute, adapted for vision by night as well as by day. Their sense of hearing is also exquisite, and their long whiskers are delicate organs of the sense of feeling.

Q. What is the lamprey?

A. The river lamprey, formerly considered a fish of considerable importance, is from twelve to fourteen inches long: it feeds on insects, worms, &c., and is very prolific.

Q. Is the death of one of our kings attributed to eating too freely of lampreys?

A. Yes, that of Henry the First. The city of Gloucester is required, by an ancient custom, to send the sovereign a lamprey pie at Christmas, when it is difficult to procure them.

Q. Which is the most important cod fishery?

A. That on the great bank, near the island of Newfoundland, a vast mountain on the east coast of North America.

Q. How do the fishermen shelter themselves from the weather there?

A. When the ships arrive at the fishery, a kind of gallery is formed, and furnished with tubs stove in at one end; the men go into these, and have each a kind of roof over their heads; and they fish, with hooks and lines: an expert fisher has sometimes taken 400 in a day.

Q. What is done with them?

A. The heads are cut off; the livers, tongues, insides, and spines, are taken out; the fish is then salted and packed in barrels, as green or wet cod; or spread out on the shore to dry, and then called dry cod.

Q. What is done with the other parts?

A. The tongues and sounds are generally salted and packed in barrels for sale; the liver yields an excellent oil, most valuable as a medicine; and the roes are salted and sold to the Dutch, French, and Spaniards, as bait for anchovies and other fish.

Q. Do haddocks go in shoals?

A. Yes; a shoal of them has been said to extend four or five miles in length, and nearly one in breadth.

Q. Is there a kind of cod called ling?

A. Yes; and is of great importance to the Norwegians; more than 900,000 lbs. weight are annually exported from thence. From the liver a considerable quantity of well-flavoured oil is obtained.

Q. Is the salmon a prolific fish?

A. Yes; the roe of the female is said to contain 20,000 eggs.

Q. Why do salmon go up rivers to deposit their spawn?

A. Because if the water were salt the spawn would not produce fish.

Q. What is char?

A. A fish found in Windermere, and some other lakes in England and Wales: it is often potted in jars made on purpose, with the fish painted round them, and sent to London.

Q. From what does the smelt take its name?

A. From its peculiar smell; the word being only an abbreviation of "smell it."

Q. Is the herring a valuable fish?

A. Yes, most valuable; for the herring fisheries afford employment and support to many thousand families.

Q. How are they taken?

A. By nets placed across the water.

Q. How are red herrings prepared?

A. They are soaked in brine for some time, then washed, and afterwards hung upon little wooden spits in a chimney built to receive them.

Q. What is then done to them?

A. A fire of brushwood is kindled under them, yielding much smoke but no flame; there they remain till ready for packing.

Q. What are bloaters?

A. Herrings that are very little salted, and smoked for a few hours only, very soon after they are caught; in this state they are a great delicacy.

Q. What is the pilchard?

A. A small fish resembling the herring, but of a rounder form, and with scales considerably larger.

Q. Is it very abundant?

A. Yes; the Cornish pilchard fisheries produce, on an average, 60,000,000 per annum.

Q. How are they caught?

A. By seans or drift nets, varying from 200 to 300 fathoms in length: a

single sean will sometimes contain 1200 tons of fish.

Q. What is the anchovy?

A. A small fish of the herring tribe, abounding in the Mediterranean. It is also found on some of our western coasts.

Q. Do we use them much?

A. Yes; both salted and as an essence.

Q. What is thought of the carp?

A. That it might become a very valuable fish, if the mode of propagating them was sufficiently understood.

Q. Is their increase great?

A. So much so, that we are told of a pond, into which were put four male and three female carp, and in one year there were 110,000 fish!

Q. What should be particularly attended to for increasing their propagation?

A. The growth of vegetation in the ponds in summer, and in winter care should be taken that the ice be broken: they have been known to live more than 100 years!

Q. Will they live long out of water?

A. Yes; for some days, in a cellar, on wet moss or straw; and if fed with

white bread and milk, they will even become fat.

Q. What is made of their roes?

A. A kind of caviare, which is sold in quantities to the Jews. Caviare is also made of the roe of the sturgeon, but the Jews hold this in abhorrence.

Q. What can you tell me about the tench?

A. It is one of the most useful fresh water fish, from the ease with which it may be preserved and its increase promoted, its tenacity of life, and the goodness of its flesh.

Q. From what do the French manufacture their beautiful artificial, or Roman pearls?

A. From the scales of a fish called the bleak, which are scraped off into clear water, and beaten into an extremely fine pulp, the water being changed till they are entirely free from colour.

Q. What is then done?

A. The silvery matter which is left precipitates to the bottom, and the water is carefully poured off; the matter is then mixed with a little size, and put into thin glass bubbles.

Q. How are the real pearls procured?

A. By divers trained to this dangerous employment, who descend from their boats with a rope round their waists, and a stone fixed to their feet, to quicken their descent.

Q. How are pearls procured?

A. The divers descend sometimes to a depth of seventy feet to seek for the oyster in which pearls are found.

Q. How do the divers prevent the water from rushing into their ears and nostrils?

A. By stuffing them with cotton; and they breathe through a sponge dipped in oil, which admits air to be drawn through without water.

Q. What else has he?

A. A little basket to hold the shells, and a knife to loosen them: when his basket is full, or himself exhausted, he unfastens the weight at his feet, shakes the rope, and is drawn up.

Q. Where are the principal pearl fisheries?

A. In the east, on the coasts of the island of Ceylon; and, in the west, on the coast of Terra-firma, and the Gulf of

Mexico; in the Persian Gulf; and at the Tooloo islands, off the coast of Algiers. There are some pearls found on the coast of Scotland, and in a river of Wales. It is said that a pearl from the Conway, given to Charles II., was placed in the regal crown.

Q. How are they sorted?

A. By passing them through sieves of different sizes.

Q. Which is the most remarkable pearl we read of?

A. One bought by Tavernier at Califa, in Arabia, in the days of Pliny, for the monstrous sum of £100,000.

Q. Of what size and shape was it?

A. A pear-shape, from two to three inches long, nearly one in diameter, and without blemish.

Q. Who bequeathed to posterity an extraordinary instance of extravagance, in the use made of a pearl?

A. Cleopatra: she took one of her magnificent pearl ear-rings, said to be worth as much as £84,000, and dissolved it in strong acid, and then drank the precious draught to the health of Anthony.

Q. What was said to shew the value of this pearl?

A. That its equal could not be found; and the one that was left was cut in two for a pair of ear-rings.

Q. What are the small pearls called?

A. Seed pearls, and are of little value.

Q. Is the oyster you spoke of, in which pearls are found, the same as those which are eaten?

A. No; the pearl oyster is larger.

Q. What is nacre, or mother of pearl?

A. The inner part of the shell of the pearl oyster, which is separated from the outer part by aquafortis, or by the lapidary, and forms a great branch of trade in China.

Q. Where are the best oysters found?

A. In the waters of Maldon and Colne, in Essex, and at the mouth of the Thames.

Q. How are they taken?

A. By dredging nets, that is, nets with iron scrapers at the mouth: these are dragged over the beds or places where the oysters are fixed to the rocks, to gather the young fish, which are then put into large pits prepared for them.

Q. What is clutch?

A. Old shells, pieces of wood, &c., thrown into beds for the spawn, which resembles drops of melted candle grease, to be deposited upon.

Q. What is the scallop?

A. A larger fish, whose shells occur in abundance on the coast of Palestine. They were frequently placed on the hats of those who had been a pilgrimage to Jerusalem.

Q. What is the cockle?

A. A smaller double-shelled fish: it is found two or three inches in the sand.

Q. Was the cuttle fish eaten by the ancients?

A. Yes; and considered a delicacy. The Italians eat it now; and the bone in the middle was used as medicine.

Q. Is Indian ink made from it?

A. Some think so; as there is a vessel in the body of the fish containing a quantity of inky fluid, which the animal throws out when alarmed.

Q. Where is Indian ink made?

A. In China; and the art is kept secret.

Q. Where is the turbot found?

A. On the northern coasts of England

and Scotland, as well as on those of France and Holland. The Dutch alone are said to draw not less than £80,000 a-year for the supply of this fish to the London market.

Q. Was the perch a favourite fish with the ancient Romans?

A. It was. The skins are used by the Laplanders, cooked into a kind of jelly, and for making glue; and in the village of Lisse, on the Haaslem Mere, celebrated dishes are made from their milts, whilst of its scales, whitened and cleaned, pretty ornaments are made.

Q. Why are mackarel allowed to be sold on Sundays?

A. Because they spoil sooner than any other fish.

Q. Is there any marine, or sea animal, with a tusk of ivory?

A. Yes; the walrus, or sea horse, has two tusks in the upper jaw, directed downwards. They are sometimes two feet in length, very close grained, and preferred for artificial teeth to that of the elephant.

Q. Has this tusk been long used as ivory?

A. Yes; we are told these animals,

under the name of horse whales, were sought for even in the reign of Alfred, for their tusks and oil, the latter being as good as that from the whale.

Q. Is their skin of any use?

A. Yes; the Greenlanders make a thick and strong harness of it, for their seldges and carriages: they sometimes twist narrow strips of it into cables upwards of sixty ells in length.

Q. Do they use any other part?

A. Yes; they split the tendons, and use them as thread.

Q. What are the tendons?

A. White elastic fibres, which join the muscles, of flesh, with the bones.

Q. What are whales?

A. Immense marine animals, from fifty to a hundred feet long: the head is nearly one-third of their whole size.

Q. Are whales considered to be fish?

A. No; because they produce their young alive, and suckle it in the same manner as land animals.

Q. In what do they differ from fish?

A. In having red and warm blood in circulation through their bodies.

Q. What part of the whale gives the oil?

A. Principally the fat, found under the skin, to the depth of ten or twelve inches: this is called blubber; and the tongue, when boiled down, yields five or six barrels of it.

Q. How is the whale caught?

A. Every ship which goes out to seek for whales, takes five or six boats, each of which carries a harpooner, a man at the rudder, and four rowers.

Q. What is the harpooner?

A. A man who strikes the whale with a harpoon, an iron instrument formed at one end like a barbed arrow, and having a rope fastened to the other.

Q. What happens when the animal has been struck?

A. He instantly plunges under the water, drawing the cord out with such violence, that if the place over which it runs be not kept wet, it takes fire.

Q. How is he again found?

A. When he rises to take breath, he is followed and again struck; and when exhausted, he is dragged into the ship.

Q. Is whalebone really the bone of the whale?

A. No; it is a horny substance, which supplies the place of teeth, catching and securing the animal's food; the sperm whale has teeth in the lower jaw.

Q. How is this horny substance placed?

A. On each side of the mouth from the upper jaw, in thin blades, or plates, of which there are sometimes seven hundred.

Q. What size are they?

A. The largest measure from ten to fifteen feet in length, and from twelve to fifteen inches in breadth; they all terminate in a kind of long fringe, which looks like the blade split into innumerable fibres.

Q. Are whales very voracious?

A. Quite the contrary; indeed the throat is so small, not more than four or five inches across, that they could not swallow anything large.

Q. Is their mouth very large?

A. So large, that it opens back to the eyes; and the tongue is sometimes eighteen or twenty feet long, and nine or ten broad.

Q. Of what use is whalebone?

A. It is much better than cane for the tops of umbrellas and parasols, being more elastic, and less liable to split; it is also used in making whips.

Q. Is the flesh ever eaten?

A. It is by the Greenlanders, both fresh and dried; but it is all coarse and unpalatable, except the heart.

Q. Are any other parts useful to the Greenlanders?

A. Yes; from the intestines they prepare a substance which serves instead of window glass; they build their houses, and make their fences with the ribs and large bones; they make fishing lines of the whalebone fibres; and cords and nets of the tendons.

Q. Are whales ever found on the coasts of Britain?

A. Yes; and if stranded there, that is, thrown on the shore, they belong to the sovereign.

Q. What other sea animals are useful to man?

A. There are other species of whales which afford us many useful articles; the

flesh of the fin-backed whale is said to be as good in every respect as that of the sturgeon.

Q. Is the oil as good?

A. Much better; but there is little of it; and the bone is short and narrow.

Q. Which gives the best oil?

A. The spermaceti whale, or blunt-headed chalot; this oil burns brightly, and without any unpleasant smell.

Q. Is it from this whale we have the spermaceti?

A. Yes; it is found in large cavities of the skull, quite separate from the brain: when the whale is living, this is in a fluid state, but when dead, it is found in somewhat solid lumps; it is also distributed along the back.

Q. For what is it used?

A. In medicine, in ointments, and for candles.

Q. Is ambergris found in this whale?

A. It often is; and sometimes it is found floating in the sea in tropical climates.

Q. What is its description?

A. It is solid, opaque, variegated like

marble, and remarkably light; it is highly inflammable, and, when heated, emits a fragrant odour.

Q. What use is made of it?

A. In Asia, to flavour dishes; and, in Europe, as a perfume.

Q. Is the narwhale, or sea-unicorn, a species of whale?

A. It is; and the name *narh-wal* signifies a whale which feeds on dead bodies.

Q. For what are these whales sought?

A. For their oil, which is superior to that of the great whale, and is used by the Greenlanders, both as food and to burn: they also eat the flesh, and use the tendons as thread.

Q. Why are they called unicorns?

A. From a long, twisted, tapering weapon of ivory, from six to ten feet long, affixed to the upper jaw: it is occasionally found with two of these bones.

Q. Is this much valued?

A. Yes; it possesses extreme density and hardness, and has a dazzling whiteness which does not pass into yellow: the king of Denmark has a throne, in the castle of Rosenberg, formed of these weapons.

Q. Is the seal a marine animal?

A. It is; all its feet are webbed, and it is found on almost all the northern shores of Britain; it is from four to six feet long.

Q. For what are seals caught?

A. Chiefly for their skins; they also yield oil, of which that of the Greenland seal is the best.

Q. Is the flesh of the seal ever eaten?

A. Yes; that of the great or bearded seal is said to be as white as veal, and the lard is deemed "most delicious:" to the Esquimaux, the seal is of as much importance as bread to a European.

Q. For what are their skins used?

A. For clothing; coverings for beds, houses, and boats; for thongs and straps of all kinds.

Q. What do the Americans make of them?

A. They fill them with air to make a kind of raft; the skins of the entrails are employed instead of window glass, and sewed together to make shirts, and other wearing apparel.

Q. What is made of the fur?

A. The long coarse hair is pulled off,

and there remains a fine, short, silky down, used for trimming ladies' dresses, and woven with silk into delicately-soft shawls.

Q. Is the otter a marine animal?

A. Yes, and a fresh water one also; the flesh of the young sea-otter is considered as delicate as lamb.

Q. For what are they chiefly valued?

A. For their skins; the fur is more valuable than that of the sable, only it is thick and heavy.

Q. Where are those with the best fur caught?

A. At Kamschatka: they are usually black, though some are brown, like the common otter.

Q. Is the dolphin also an animal?

A. Yes, for it has warm blood, and nurses its young.

Q. What did Pliny, the Roman naturalist, believe of them?

A. That they could be rendered so tame, as to be mounted and ridden over the sea.

Q. Is the flesh good for food?

A. No; it is hard and insipid; yet Dr. Caius says, that a dolphin, caught in

his time, was thought a present fit to be sent to the Duke of Norfolk.

Q. Is the porpoise a kind of dolphin?

A. It is like one, but not so active.

Q. Was their flesh much esteemed here formerly?

A. Yes; it is said to have been introduced at the tables of the English nobility as late as the time of Queen Elizabeth. Greenlanders regard the oil as delicious. Their skins make excellent coverings for carriages.

Q. Are these animals what are called amphibious?

A. No; a truly amphibious animal should possess the double apparatus, lungs and gills, at one and the same time, for extracting the principle which supports life, both on land and water.

Q. Where is the tortoise found?

A. For the most part they inhabit the warmer regions; the common tortoise is found in almost all the countries bordering on the Mediterranean Sea: many species will bear transplanting to colder climates, where they pass the winter in a torpid state.

Q. Is their shell very strong?

A. Yes; they have been run over by a waggon without being injured.

Q. Do they live to a great age?

A. It is said they have lived to be more than two hundred years old.

Q. Are turtles a kind of sea-tortoise?

A. They are; but very much larger; the green, or common turtle, is sometimes six feet long, and weighs five hundred pounds and upwards.

Q. Are they valuable?

A. Yes; both the flesh and the eggs are eaten; the shells are converted into canoes, shields, and even covering for houses.

Q. How are they caught?

A. By various means, but frequently by being turned on their backs, when asleep, as they cannot turn back again.

Q. Are the eggs of the alligator eaten?

A. Yes; and those of the crocodile also; indeed the natives eat their flesh, and the Americans make toys of their teeth, which are as white as ivory.

Q. Do crocodiles and alligators devour men?

A. Yes; they are both extremely voracious.

Q. Is there any animal that devours crocodiles' eggs?

A. Yes; the ichneumon.

Q. What sort of an animal is it?

A. Of the weasel tribe, easily tamed, and very active, and often kept, both in Egypt and India, to destroy vermin.

Q. Is the guana of the same species as the crocodile?

A. Yes; it is found in many parts of America and the West Indies; it is from four to six feet long; the flesh is delicate and well tasted, and the melted fat is used in various ways.

Q. Are frogs ever eaten?

A. Yes; in France, Germany, and other countries on the continent, they are considered a luxury.

Q. Are all frogs eaten?

A. No; the edible frog is rather larger than the common frog, of an olive green colour, with black spots or patches on the upper part of the body, and from the tip of the nose down the back run three distinct yellow stripes.

Q. How is the conger, or sea eel, caught?

A. With strong lines, about 500 feet

in length, and 60 hooks, placed eight feet apart.

Q. Is the flesh good to eat?

A. Not when fresh, as it is coarse and greasy; but when it is dried and powdered, the Spaniards and Portuguese use it to thicken and flavour their soups.

Q. What are sand eels?

A. A small eel-shaped fish, which is dug out of the sand, at low water, and is so quick in its movements, that if not caught the moment it is turned out, it will bury itself again.

Q. Is the sturgeon a very useful fish?

A. Yes; the flesh is firm, white, and of excellent flavour: caviare is made from the roe, and isinglass from the sound or air-bladder.

Q. Where is the isinglass sturgeon found?

A. Chiefly in the Black and Caspian Seas; it is the longest species, and frequently attains the length of 20 or 25 feet.

Q. What is done with the sturgeon caught near London?

A. They are taken to the Lord Mayor and by him presented to the sovereign.

Q. Are there many insects that are useful to us?

A. Yes, a great number.

Q. Can you give me some account of the bee?

A. There are many species of bees, but the honey-bee is celebrated for its singular and wonderful instinct, and prized for the valuable product of its industry.

Q. How do bees live?

A. In swarm, or societies, of from 10,000 to 40,000, which contain three sorts of individuals; the queen, the working bees, and the drones.

Q. How do bees ventilate their hives?

A. By the rapid vibration of their wings: a certain number of the working bees are always engaged during the summer, both within the hive, and at the entrance, in keeping up this vibratory motion.

Q. How is the wax formed?

A. It oozes out from little cells under the scales of the abdomen.

Q. What is honey?

A. The juice of flowers, drawn out by bees, and brought to their cells.

Q. What is bee-bread?

A. The pollen of flowers, which settles on the hairs that cover the bodies of the bees, and is collected by a brush of the second pair of legs, and placed in a hollow in the third pair.

Q. What do they use this for?

A. As food for the young bees.

Q. What is a swarm?

A. When a hive is too full, a colony is sent out, under a new queen, to seek another home: she generally settles near the old hive, and the rest form a thick cluster around her.

Q. How are the bees hived after they have settled on some spot?

A. They generally alight on a bush, or the branch of a tree: to this the hive is brought, and the bees are gently shaken into it.

Q. Is honey very useful?

A. It is; it supplies the place of sugar; and a wholesome fermented liquor, called mead, is made from it.

Q. Is the wax useful?

A. Very; but more so after it has been bleached by melting it in water,

and exposing it for some time to the action of the sun and air, when it becomes quite white.

Q. What is then done with it?

A. It is cast into thin cakes, and used principally for candles and ointments.

Q. What insect is used for making blisters?

A. The cantharis, or Spanish fly; it is about three quarters of an inch long, of a shining gold green colour, sometimes changing to bluish green, with black antennæ. The flies are killed by exposing them to the vapour of hot vinegar, and then dried and pounded for use.

Q. What are antennæ?

A. The long hair-like horns which grow on the front of the heads of insects.

Q. Of what use are these supposed to be.

A. They are the means by which they are apprized of danger, and communicate with each other. They were long considered to be organs of touch; but the experiments of various naturalists have led to the conclusion that they are organs of hearing.

Q. Can you tell me the orders of insects?

A. Milne Edwards classes insects under ten orders: first, Coleoptera, with elytra, or shell-like cases, covering the wings, like a beetle.

Q. What is the second?

A. Orthoptera, having straight wings, like a cricket or cockroach; the locust and praying mantis are of this order.

Q. What is the third?

A. Neuroptera, or nerve-winged; this order includes dragon-flies, and the destructive termites, or white ants.

Q. What is the fourth order?

A. Hymenoptera, or membrane-winged; to this order belong the gall-flies, ants, wasps, and bees.

Q. The fifth?

A. Lepidoptera, having four wings, covered with fine scales like powder, as a butterfly.

Q. What is the sixth?

A. Hemiptera, or half-winged, like the cicada and boat-fly.

Q. What nation used to wear golden images of the cicada in their hair?

A. The Athenians.

Q. The seventh?

A. Diptera, with only two wings, as the house-fly.

Q. What is the eighth?

A. Rhipiptera; they have also only two wings, which are folded longitudinally, like a fan. Two genera only are known.

Q. What is the ninth order?

A. Anoptures, or parasites. This order is not numerous, and is composed of insects which are always without wings, and which have the mouth arranged for suction.

Q. What is the tenth.

A. Thysanoures. These insects are likewise without wings, and, like the preceding, undergo no change of form; but they are distinguished from them by their masticatory apparatus: the podurella, a small insect found under stones, or floating on the surface of stagnant waters, is one of this order.

Q. What are reptiles?

A. The class reptiles includes all cold-blooded vertebrate animals which breathe the air.

Q. Can you name some reptiles?

A. Serpents, crocodiles, frogs, tortoises.

Q. Are there any winged reptiles?

A. Yes; there is one called the dragon, which inhabits India; it resembles a lizard, and has a large fold of skin resembling the wings of a bat, which it uses in dropping from branch to branch.

Q. What is the name of the winged reptile, of which fossil remains have been discovered?

A. The Pterodactyle; it could both walk and fly.

Q. Are locusts ever eaten?

A. Yes; in Egypt, Arabia, and Syria: the Arabians stew them with butter, and make them into a kind of fricassee.

Q. Is there a vegetable called locust?

A. There is a kind of pulse, which grows in Jamaica, so called.

Q. What is pulse?

A. All seed contained in pods.

Q. What are the insect locusts like?

A. Not unlike our large grasshoppers: the Moors prefer locusts to pigeons.

Q. Do any birds pass their summer with us, and fly away before the winter?

A. Yes; they are called migratory birds, or birds of passage; and the regu-

larity of their movements is very wonderful.

Q. Can you give me any particular example of this?

A. Yes, the puffin: there is an island near Beaumaris, which, from the amazing numbers that flock to it and lay their eggs there, is called Puffin's island; but in August they take flight, and are not seen there again till April.

Q. Are swallows migratory?

A. Yes, all of them: there are four sorts which visit this country.

Q. Which are they?

A. The martin, the sand-martin, the swift, and the chimney, or common swallow.

Q. Which of the swallows arrives the latest in this country?

A. The swift; it also leaves the earliest: it is larger than any other of the tribe: its colour is sooty black with a greenish tinge.

Q. Are these birds very useful?

A. Yes; for they feed on flies, gnats, and other insects.

Q. Is there a swallow whose nest is eaten?

A. Yes, the esculent swallow: the Chinese carry on a great trade in these nests.

Q. What are they like?

A. Something like isinglass, very brittle, and in shape like a common swallow's nest, the flat side adhering to the rock; the best are nearly white.

Q. Where are they found?

A. In caves in various islands in the Eastern Archipelago, particularly in Sumatra; they are collected by means of ladders of bamboo and reeds, and many lives are lost in the attempt.

Q. What are bamboos?

A. The stalks of a plant of the reed kind, which grows in the East Indies, to a height of ten or twelve feet from the ground; the old stalks are five or six inches in diameter.

Q. For what do the Indians use them?

A. To construct cottages, bridges, boxes, masts for boats, and pipes for water.

Q. How are the swallow's nests mostly used?

A. To thicken soups or stuff fowls:

these nests are not taken till the young birds are fledged.

Q. Are pigeons migratory?

A. In some degree, as they come here from the northern countries at the approach of winter, and return in the spring.

Q. Why are these pigeons called stock-doves?

A. From their being the stock, or origin, of our domestic pigeon.

Q. Does the domestic pigeon increase very rapidly?

A. Yes; for though they have only two at a time, they have them eight or nine times in the year.

Q. Are they considered very injurious to the farmer?

A. Yes; because as they live nearly on grain, they devour enormous quantities.

Q. Are there many varieties of the pigeon?

A. Yes, more than twenty: of these the carrier is the most remarkable.

Q. For what reason?

A. From a natural attachment to their homes: if taken almost any distance, they

will rise, as soon as they are let loose, to a great height, and then, by some wonderful instinct, dart in a direct line to their home, at the rate, perhaps, of 30 miles an hour.

Q. Who established a regular post system by means of these pigeons?

A. Sultan Noureddin Mahmoud: it lasted above 70 years.

Q. How are they distinguished from other pigeons?

A. By a broad circle of naked white skin round each eye, and are larger than most of the common-sized pigeons.

Q. Will you name some other kinds?

A. There are fantails, tumblers, ring-doves, and the passenger-pigeon, which migrates from one part of North America to the other in such numbers, that, according to Wilson, they have been calculated to extend at least 240 miles!

Q. Is the nightingale a migratory bird?

A. Yes; generally arriving in this country in April, and leaving it in September for Egypt and Syria.

Q. What bird will learn the song of the nightingale?

A. The redbreast; and in a very short time.

Q. Are skylarks found in every quarter of the world?

A. No, not in America.

Q. What is there peculiar in their singing?

A. That they pour out their song whilst hovering in the air: you may hear them when they seem but a speck in the sky.

Q. Do they rest on trees?

A. No; from the length of their spur they cannot perch, but always alight on the ground, where they build their nests.

Q. Does the woodlark perch on trees?

A. But rarely; its song is also uttered whilst on the wing, but its flight is said to be in wheeling circles, and not, like that of the skylark, in a gradual perpendicular ascent.

Q. Will the grey linnet learn the note of almost any bird?

A. Yes; three linnets were reared under a skylark, a wooklark, and a titlark; they all adhered to the song of their respective instructors.

Q. Are canaries of this class?

A. Yes; they come from the Canary islands: in the wild state, the prevailing colours are grey or brown.

Q. When were they first brought into notice?

A. Early in the 16th century, but were then very expensive: they were called sugar birds, from an idea of their being partial to the sugar-cane.

Q. Are our blackbirds and house-sparrows very useful in destroying worms, snails, &c.?

A. Yes; they consume a very great quantity.

Q. Is the rook of service to the farmer?

A. Yes, in destroying insects; though there is an idea that they feed upon the grain, and do a great deal of mischief; but it is the opinion of attentive observers that they greatly overpay any injury they may do to the coming harvest, by their destruction of grubs, larvæ, worms, and noxious insects.

Q. What is the favourite food of ravens?

A. Carrion; the eggs of birds and the

young of animals are also greedily sought after; but they do not prey so much upon insects and their larvæ as the lesser species of crows. They are said to live 100 years.

Q. Are barn-owls useful to farmers?

A. Yes, exceedingly so, by their destruction of vermin. When they have young they will bring a mouse to the nest every twelve or fifteen minutes.

Q. Do fieldfares remain with us throughout the whole year?

A. No; they generally leave us about March or April. The fruit of the mountain ash is their favourite food; when this fails, they frequent marshy lands, and in times of continued frost, are easily taken with the hand, in a state of complete exhaustion.

Q. Where did some of the fowls originally come from, that are now common in England?

A. The turkey came from North America, about the reign of Henry VIII.

Q. Is it difficult to rear?

A. Yes; the young are subject to a variety of diseases, from cold, rain, and dews.

Q. Has it a great dislike to scarlet?

A. Yes; flocks of several hundreds are sometimes driven along the road without any other means of keeping them in order than a long stick with a scarlet rag at the end of it.

Q. Were peacocks once introduced at great feasts?

A. Yes; they were usually baked in a pie made in the form of the bird, with the head raised above the crust, the beak richly gilt, and the tail expanded.

Q. What custom prevailed in regard to them in the days of chivalry?

A. It was common for the knights to make their vows of enterprise at a solemn feast, on the presentation to each knight in turn, of a roasted peacock on a golden dish.

Q. What countries are they natives of?

A. The East Indies, and other parts of Asia; also several parts of Africa.

Q. Where do pheasants come from?

A. They are supposed to have been brought into Europe from the banks of the Phasis, a river of Colchis, in Asia;

they are also found in other parts of Asia, and in Africa.

Q. Are our domestic poultry of the same tribe?

A. They are; and very few birds are so important to mankind.

Q. In what particular manner?

A. Whilst living, they supply us with eggs; when dead, their flesh affords us food: and their feathers are used for filling beds and pillows.

Q. Are chickens sometimes hatched in ovens?

A. Yes, it is the custom in Egypt; it was also tried in France, and is now practised in London.

Q. Where did the guinea-fowl come from?

A. Africa: in Jamaica and other West India islands, the guinea-fowls commit serious depredations by scratching up and devouring seed-yams, &c., and are sometimes caught by steeping a quantity of corn in rum, which, mixed with cassava, the fowls eagerly devour, and, becoming intoxicated, are easily taken.

Q. Are red grouse peculiar to the British islands?

A. They are generally supposed to be so; but are found in packs, as it is called, of forty or fifty, on our mountainous heaths.

Q. Are they sometimes reared in confinement?

A. Yes, by supplying them almost daily with fresh pots of heath.

Q. Are there several kinds of grouse?

A. Yes; the wood grouse, or capercailzie; the red, the black, and the white grouse, or ptarmigan.

Q. What change takes place in the plumage of the ptarmigan?

A. At the commencement of winter their plumage turns white, when all the feathers are doubled, except those of the wings and tail. They are found as far north as Greenland.

Q. Which are the largest land birds produced in England?

A. Bustards, which were formerly seen on Salisbury plain, and other parts; but since so many inclosures have been made, they are thought to be nearly extinct: they measure about four feet.

Q. Were herons more numerous once than they are now?

A. Yes; a few centuries ago heronries were almost as common near noblemen's seats as rookeries are now; they were then ranked among royal game.

Q. Why were they so much prized?

A. Because it was a favourite diversion to pursue them with falcons, when hawking was the fashion.

Q. Were they much esteemed for the table?

A. Yes, they were thought equal to pheasants or peacocks; they were esteemed royal game, and a fine of twenty shillings was imposed upon any person who took their eggs.

Q. Are their plumes now used to ornament the caps of the knights of the garter?

A. Yes, mixed with those of the egret.

Q. What is the egret?

A. A bird of the heron species, of which there are two kinds, the great and the little.

Q. Do herons destroy great quantities of fish?

A. Yes; it is said that a heron will

destroy nearly three thousand carp in a year! but Waterton thinks this idea erroneous, as the heron can neither swim nor dive; it can only catch those fish that are in shallow water. It devours greedily water-rats, mice, &c.

Q. Is the bittern an English bird?

A. Yes; but in colder climates they are migratory: they were formerly esteemed a great luxury.

Q. Are ruffs and reeves different kinds of birds?

A. No; they are the male and female of the same species.

Q. What is the distinction?

A. The male has a curious arrangement of feathers round his head, after he is twelve months old, which drop off every year.

Q. Have they any curious habit?

A. Yes; a ruff will take possession of a small piece of ground, and walk round it till all the grass is worn away in the shape of a circle; these circles the fowlers call hills.

Q. Is it here they are caught?

A. Yes; when a reeve alights, all the ruffs begin fighting, and in the contest

they are entangled in the nets of the fowlers.

Q. How do the lapwings, or pewets, get their names?

A. The first from the flapping noise they make with their wings when flying; the others from their peculiar cry, *pee-wit.*

Q. How do lapwings endeavour to protect their young from the approach of strangers?

A. By pretending to walk lame, and thus inviting pursuit.

Q. Does the dotterel remain in England during the summer?

A. No; it is a periodical visitant, coming during the months of April and May, on its way to more northern regions, and again in September and October, on its return.

Q. In what county are they seen in great numbers?

A. In Cambridgeshire; they haunt fallow and newly sown corn fields, feeding on worms, slugs, and insects.

Q. What bird is it which cries *crek, crek, crek.*

A. The land-rail, or corn-crake, which runs so rapidly, that when a per-

son comes near it, it may in an instant be heard forty or fifty paces distant.

Q. What is the difference between the wild and the tame swan?

A. The wild is not so large as the tame, and the *cere*, or naked skin round the base of the bill, is yellow instead of black.

Q. Are swan skins generally made into muffs, tippets, and powder-puffs?

A. Yes; the inhabitants of Iceland and Kamschatka make garments of different kinds of them.

Q. Was the tame swan another of the birds used in such profusion at Archbishop Neville's feast?

A. Yes; there were no fewer than four hundred: but the cygnets only, or young ones, are eaten now.

Q. Were all persons allowed to keep them in the reign of Edward IV?

A. Only those who possessed a freehold of five marks yearly: a mark is a silver coin worth three shillings and fourpence, which was of more importance then than much larger sums would be now.

Q. Are geese of more use to us than swans?

A. Certainly, if only for their quills; but swan quills make excellent strong pens.

Q. Where are geese kept principally for their quills?

A. In the fens of Lincolnshire.

Q. Are the feathers and quills taken whilst the birds are alive?

A. I fear they are, sometimes very cruelly; but as birds moult, that is, lose their feathers once a year, at that season they may be taken without inflicting pain on the bird.

Q. Are not the feathers of geese preferred, to those of other domestic fowls, for beds, &c.?

A. They are, and their quills are the best for pens.

Q. Do metal pens very much supply their place now?

A. Yes; and are now brought to great perfection.

Q. How long have pens been used for writing.

A. It is supposed that quill pens were

not used for writing till the sixteenth century.

Q. What was used before then?

A. Reeds split and shaped to a point in the same manner.

Q. And what before those?

A. The stylus, an instrument with a sharp point at one end, and a broad thin one at the other, like a chisel.

Q. How was this used?

A. The Chinese, before the invention of paper, wrote with these styles upon thin boards, or bamboo; all ancient records were engraven on stone, or metal; table books of bark, or wood, were in use before the days of Homer.

Q. But of what use was the broad end of the stylus?

A. In the latter days of Greece and Rome, the table books, and even the tables for writing upon, were covered with wax; and when the writing was required to be effaced, the wax was smoothed over by the broad end of the stylus.

Q. Where do our ducks come from?

A. The origin of them is the wild

duck, which breeds in the fens of Lincolnshire; and is also found on the continent of Europe, in Asia, and America.

Q. What is the eider duck?

A. A species of duck, which inhabits the frozen regions of the north: it is very abundant in Iceland, Lapland, and Greenland, also on the shores of Baffin's and Hudson's Bays, &c.: it forms the outside of its nest of marine plants, and lines it with down plucked from its own breast.

Q. For what is eider down used?

A. For beds and coverlets, being preferred to all other on account of its warmth, lightness, and elasticity.

Q. How is it sold?

A. In balls, about the size of a man's fist, weighing from three to four pounds: one of these balls, when opened, will fill a quilt five feet square.

Q. Is it true that the pelican opens its breast to feed its young?

A. No; it is furnished with a bag attached to the lower mandible of the bill, so large as to be capable of containing a quantity of fish, which it thus carries to

the nest for its young, and has often been known to give some to a wounded companion: this gave rise to that idea.

Q. How are ostrich feathers procured?

A. From the wings and tail of a bird, seven or eight feet high, which inhabits the plains and deserts of the torrid regions of Asia and Africa.

Q. Can these birds fly?

A. No; but they can run as swiftly as a horse can gallop.

Q. Are their eggs eaten?

A. Yes, and considered a great delicacy: the shell is so thick they will keep good a length of time even at sea; they weigh about three pounds each.

Q. Are the feathers of the bird of paradise worn sometimes by ladies?

A. Yes; there are several varieties of them, but they were at one time said to be without legs.

Q. What gave rise to this idea?

A. I suppose, because the legs were always cut off by those who sold them, that the skins might be more easily preserved; the legs are also so short, that when the bird lights upon the ground, it has great difficulty in rising again.

Q. How are they caught?

A. They are caught in snares, or shot with blunt-headed arrows.

Q. Does the cuckoo always lay its egg in another bird's nest?

A. Generally: it deposits them in the nest of the hedge-sparrow, tit-lark, or water wagtail, but most frequently in that of the former.

Q. Is there anything peculiar in the form of a young cuckoo?

A. Yes; there is a hollow in the back in which it lifts out the eggs, or even the young of the bird, in whose nest it has been placed.

Q. What is the bee-cuckoo, or honey guide?

A. An African bird, rather larger than a sparrow, celebrated for its habit of guiding the natives to the nest of wild bees, enticing them to the spot by flitting before them and reiterating a peculiar cry.

Q. How are these birds protected from the sting of bees?

A. The feathers are short, hard, and pressed close to the body, and the skin is thick and tough.

Q. How are they brought to perfec-

tion for the table in Italy and the south of France?

A. By confining them in a room from which the rays of the sun are excluded, and which is lighted by lamps kept constantly burning, where they are fed with millet seed and other nutritious food.

Q. What is the ortolan?

A. A bird much admired for its flesh; it is a native of the southern parts of Europe, and a summer visitor of the central and northern parts.

Q. What birds are now considered game, and protected by the game laws?

A. Bustards, pheasants, partridges, ptarmigan, and all the grouse tribe; and in some sort woodcocks, snipes, and landrails, as they may not be shot.

Q. Are the laws respecting game the same now as in former days?

A. Not exactly; now that game may be sold, no one can be punished for merely having game in his possession.

Q. How are the game laws justified?

A. Upon the ground that beasts of the chase and game being unappropriated, cannot be claimed by any one in particular; they therefore belong to the crown,

and can be given by the sovereign as she thinks fit.

Q. What are parliaments?

A. A meeting of the sovereign, the lords, and the commons, which form the legislative authority, or power for making laws.

Q. When were parliaments first arranged?

A. In England this great council has been held from the earliest date; but it is generally agreed that the parliament, as it now stands, was marked out so long ago as the year 1215, in the seventeenth year of John's reign.

Q. How do they act?

A. The commons, or gentlemen sent up by the body of the people, propose laws; which are sent up to the lords for their approval, but they have the power of rejecting them; finally the sovereign confirms them.

Q. Who are the lords?

A. Men ennobled by the sovereign; their title is hereditary, that is, descends from father to son for ever.

Q. Are all countries thus governed?

A. No; this is called a mixed govern-

ment; where all ranks assist in forming the laws by which they are to be ruled.

Q. What others are there?

A. Monarchical, which is limited or despotic according as the whole power is in the hands of one person; or when the supreme power is virtually in the laws, though the majesty of government and the administration is vested in a single person: aristocratical, where the government is hereditary, and composed of the nobles, or superior citizens,—such was that of Venice at one time.

Q. Is there any other?

A. Yes; a democratical government, or republic, where the country is governed by the people.

Q. What is the office of a Coroner?

A. To inquire into the cause of any sudden death, by summoning before him twelve persons who act as jurors, who hear all the evidence that can be procured, as to the cause of death, and decide accordingly. This is called a Coroner's Inquest.

Q. Does the Coroner do anything else?

A. Yes; if any person is proved by

the witnesses to have caused the death of another, he may, if the verdict of the jurors find him guilty of murder, commit him to prison, to await his trial for the offence. He inquires also into all causes of death, occasioned by accidents or otherwise.

Q. What are the assizes?

A. The court, place, or time, when and where trials are decided by judge and jury.

Q. What is a jury?

A. Twelve persons chosen to listen to witnesses upon a trial, and declare whether they think the person tried guilty or innocent; and, according to their verdict, the judge punishes, or acquits the accused.

Q. What do you mean by the natural divisions of the earth?

A. Those by which countries are naturally separated from each other, such as seas, rivers, and mountains.

Q. What by political divisions?

A. Those which men have separated into empires, kingdoms, republics, and states, with all their lesser states.

Q. What is an empire?

A. A country, or territory, of very large extent, where the chief magistrate, or ruler, is styled emperor.

Q. Which are the chief empires in the world?

A. Russia, Austria, Turkey, China, and Japan; also, at the present time, France.

Q. What is a kingdom?

A. A country where the chief magistrate is called king.

Q. What is a state?

A. A small territory, partaking of the nature of an aristocracy, and dependent on a larger state, as Venice, or Genoa.

Q. What do you mean by the British empire?

A. The territories subject to England.

Q. What are these?

A. Great Britain, Ireland, and the islands and other settlements in Europe, its extensive dominions in the East and West Indies, its Colonies in North America, and its settlements in South America, Africa, and Australia.

Q. What forms the island of Great Britain.

A. England, Scotland, and Wales,

which with Ireland is called the United Kingdom of Great Britain and Ireland.

Q. What do you call the possessions which Great Britain holds in India, America, the West Indies, &c.?

A. The British Dominions in India, America, &c., or British India, British America, &c.

Q. What is the population of the United Kingdom of Great Britain?

A. Twenty-seven millions, eight hundred and thirty-three thousand, five hundred.

Q. How is England geographically divided?

A. Into forty counties; Wales into twelve; and Scotland into thirty-three.

Q. What was the origin of the ridings, into which some counties are divided?

A. King Alfred divided each county into trethings, or trithings, being the third part of each; this has been corrupted into ridings.

Q. Did he make any other divisions?

A. Yes; into hundreds, or districts containing a hundred families; and tythings, containing ten families.

Q. What are circuits?

A. A division of the kingdom into six portions, for the proper administration of justice, made since the Norman Conquest.

Q. Of what form is England?

A. Triangular; 390 miles in length, and 360 in breadth.

Q. Why was it called Albion and Britain?

A. It derived its name of Albion from the Latin word *albus*, white; probably from the whiteness of its cliffs; it had the name of England from the Anglo-Saxons, and the Romans gave it the name of Britain.

Q. What are the Chiltern Hundreds?

A. A range of chalk hills in Buckinghamshire, belonging to the crown, having the nominal office of Steward of the Chiltern Hundreds attached to it.

Q. What is meant by having accepted the Chiltern Hundreds?

A. Any member of parliament who accepts office under the crown, must resign his seat, but he may be re-elected; to take the Chiltern Hundreds is the formal manner of resignation.

Q. What are the Cinque Ports?

A. Sea-ports on the coast of Kent and Sussex; there were formerly only five, but now increased to eight: they had great privileges granted to them, on account of their fitting out ships for the defence of the coast.

Q. Which are these sea-ports, and when were they chartered?

A. They were chartered by William the First, in 1077; the original five were Dover, Hastings, Hythe, Romney, and Sandwich; the other three are Winchelsea, Seaford, and Rye.

Q. What is Chronology?

A. The science of time; being derived from two Greek words which signify a description of time.

Q. How is time commonly divided?

A. Into epochs, ages, years, months, weeks, days, hours, minutes, and seconds.

Q. What is an epoch?

A. Some well-known event, from which we reckon our years, as the birth of our Saviour.

Q. Is an era the same?

A. No; an era is the period during which any thing continues; as when the Romans governed England.

Q. What is an age?

A. A century, or hundred years.

Q. What is a year?

A. The time which the earth takes to revolve round the sun, producing the seasons of spring, summer, autumn, and winter.

Q. How long a period is this?

A. Three hundred and sixty-five days, five hours, forty-eight minutes, and forty-eight seconds.

Q. When does our year commence?

A. On the first of January, which is called New-year's day.

Q. How is leap-year occasioned?

A. The civil year consists of 365 days; but there are odd hours, minutes, and seconds, which, in four years, form nearly another day, which is added to February, and this year is called bissextile, or leap-year.

Q. How many months make a year?

A. Twelve calendar months, or those fixed by law in the almanack; calendars they used to be called; or thirteen lunar months.

Q. What are lunar months?

A. Twenty-eight days, being the time which the moon takes to go round the

earth; it derives its name from *luna*, the moon.

Q. Which are the calendar months?

A. The twelve months of the year, viz:—January, February, March, April, May, June, July, August, September, October, November, December.

Q. How many days are there in each of these months?

A. This will perhaps be best remembered by the old lines:—

Thirty days hath September,
April, June, and November;
February hath twenty-eight alone,
And all the rest have thirty-one;
Then leap-year coming once in four,
Gives February one day more.

Q. How many weeks are there in a year?

A. Fifty-two.

Q. How many in a month?

A. Four.

Q. How many days in a week?

A. Seven.

Q. How is the day divided?

A. Into natural and artificial.

Q. What is the natural day and its length?

A. Twenty-four hours, reckoned from noon to noon, or from midnight to midnight.

Q. What is the artificial day?

A. That contained between the rising and the setting of the sun.

Q. Is that always the same length of time?

A. No; in our climate the longest day is sixteen hours, the shortest not more than eight; but we generally call it twelve.

Q. Why do you say in *our* climate?

A. Because the nearer we are to the poles, the more we shall find the days, or rather the time the sun is visible, to vary in its length; at the equator it always rises and sets at six o'clock.

Q. When is the day and night of equal length all over the world?

A. On the 21st day of March, and the 22nd of September.

Q. How is an hour divided?

A. Into sixty minutes, each containing sixty seconds.

Q. Which is the first quarter-day?

A. Lady-day, which is the 25th of

March; though the spring quarter begins on the 21st.

Q. Which is the second?

A. Midsummer-day, on the 24th of June: but the summer quarter begins on the 21st, which is the longest day.

Q. Which is the third?

A. Michaelmas-day, on the 29th of September; but the autumn quarter begins on the 21st.

Q. Which is the fourth;

A. Christmas-day, the 25th of December; but the winter quarter commences on the 21st.

Q. How do philosophers divide the productions of the earth?

A. Into three classes: first, the animal kingdom, containing every thing which has life and feeling; as man, beasts, birds, insects, &c.

Q. What is the second?

A. The vegetable kingdom, containing such things as have life, but without feeling; as trees, shrubs, flowers, herbs, &c.

Q. What is the third?

A. The mineral kingdom, containing stones, metals, fossils, &c.

Q. What are the outward senses of man?

A. Those of hearing, seeing, smelling, tasting, and feeling.

Q. Who were the seven wise men of Greece?

A. Thales, Solon, Chilo, Pittacus, Bias, Cleobulus, and Periander.

Q. For what were they celebrated?

A. Their moral sayings.

Q. What are spoken of as the seven wonders of the world?

A. The colossal statue, or brazen image of the sun, at Rhodes; the Egyptian pyramids; Diana's Temple at Ephesus; the Mausoleum of Mausolus, king of Caria; the walls and hanging gardens of the city of Babylon; the statue of Jupiter Olympus, by Phidias, at Elis, in Peloponnesus; and the Pharos, or watch tower of Ptolemy Philadelphus, on the small island of Pharos, in the bay of Alexandria.

Q. Are these always considered as the seven wonders?

A. No; some take the palace of Cyrus, king of Persia, and the labyrinth

of Crete, instead of the last two mentioned.

Q. Do not some of our present works almost equal in magnitude those of the ancients?

A. Yes; particularly when we consider the space over which they extend, and their utility. Our railways, surely, equal the far-famed Roman roads: but our wonders are of a different kind.

Q. What has caused them to be so?

A. The knowledge of the power of steam; the properties of electricity and galvanism; and the qualities of the loadstone.

Q. What is the great difference which you observe?

A. In the days of Egypt, Greece, and Rome, magnificence and magnitude were the objects aimed at, without considering time or expense; but now it seems to be, how great an effect can be produced by the smallest and simplest agent, and in the shortest space of time.

Q. Give me an example?

A. After the Royal George had been submerged for 60 years, a means was de-

vised for removing the whole wreck, piecemeal, by blasting.

Q. How was this accomplished?

A. Canisters containing two or three thousand pounds of gunpowder were fastened to the side of the wrecked vessel, and connected with a galvanic battery by means of a sheathed copper wire.

Q. How was the gunpowder exploded?

A. A galvanic current was conveyed along the wires to the canisters, where an explosion took place, which shattered portions of the hull. Light fragments and stores floated to the surface, and the heavier articles were picked up by divers.

Q. Is there any visible difference between electricity and galvanism?

A. Yes; in electricity the whole collected force is exhausted in one shock; in galvanism it flows in a continued stream, so long as the galvanic influence is exerted.

Q. How is the galvanic influence exerted?

A. By plates of zinc and copper, or silver, brought into contact by a fluid. generally an acid.

Q. What is electricity?

A. An extremely subtile fluid, identical with lightning, which pervades the pores of all bodies, and is capable of motion from one body to another.

Q. In what way was the first idea of electricity given?

A. By following out the discovery of Thales, that amber, when rubbed, acquired the property of attracting light substances.

Q. What is electro-magnetism?

A. The science which treats of the agency of electricity and galvanism in communicating magnetic properties; it comprehends the phenomena which shew the connection between electricity and magnetism.

Q. What is electro-chemistry?

A. An electric, or galvanic agency, which effects most surprising chemical changes.

Q. Can you mention any?

A. Yes; the patent electro-gold or silver plating, now practised at Mr. Elkington's manufactory, at Birmingham.

Q. Can you give me any idea of the ›cess?

A. The white metal, which is the basis of the plated goods, is composed of nickel, copper, and zinc, melted and poured into moulds, made sometimes of caoutchouc, glue, &c.

Q. How is it stamped?

A. The form is engraved on a steel die, and the reverse on a copper hammer, which works between two perpendicular rods, and the weight of whose fall forces the sheet of metal, placed upon the die, into the form engraved upon it.

Q. How are the surfaces polished?

A. By grinding with emery, sand, or rotten stone, by steam power.

Q. What is the solution of silver which is preferred?

A. An oxyde, or salt of silver, dissolved in cyanide of potassium.

Q. How is electricity employed?

A. The article to be coated is dipped into a tank containing a chemical solution of silver, in which also a few sheets of pure silver are immersed; being then placed in connection with the wires of a battery, a current of electricity is generated, the solution is decomposed, the

atoms of silver leave it, and cling to the metal to be plated; other atoms of silver leave the plates, until the metal is coated with pure silver.

Q. How are articles gilt?

A. In the same manner, only much more quickly; not requiring more than a few minutes, whilst silvering takes some hours.

Q. Are not some other uses now made of this process?

A. Yes; protective surfaces given to copper, iron, zinc, &c., in the same manner.

Q. What is the object of voltaic engraving, or electrotype?

A. To raise a design upon an unengraved plate of copper.

Q. Is there a method, now practised, of conveying intelligence from one place to another by electricity?

A. Yes; by means of the electric telegraph.

Q. How is this done?

A. Wires are laid from one end of a railroad to the other, through an iron tube; and brass keys, pressed upon at

one end, act by electric power through these wires upon hands placed on a dial-plate at the other; but the signalling apparatus is subject to indefinite variations of mechanical detail.

Q. What is effected by these hands?

A. They move round the dial, and point to letters and other characters.

Q. Can you tell me something of the progress of railroads?

A. In order to avoid the friction caused by the general unevenness of roads, and consequent loss of power, iron rails were laid down, which furnished a hard and smooth surface for wheels to roll upon.

Q. Which was supposed to have been the first rail-road?

A. The earliest rail-road, of which there is any account, for the carriage of merchandise and passengers, was one constructed between Darlington and Stockton, which was completed in 1825.

Q. When was the first rail-road act passed?

A. In 1801; this act granted a line to be laid from Wandsworth to Crov

don, for the carriage of coal, lime, and other goods, drawn by horses.

Q. When was the London and Birmingham railway opened?

A. On Sept. 17th, 1838, when 112 miles were traversed in four hours and fourteen minutes.

Q. How was this speed attained?

A. By means of steam; which is first mentioned by the Marquis of Worcester, in 1663, in a book called *A Century of Inventions:* he used steam to raise water.

Q. Who invented the steam cylinder and piston?

A. Newcomen, in 1705: Beighton improved the self-acting valve; but it was James Watt who brought the steam engine to perfection.

Q. Who was James Watt, and how came he to turn his attention to this object?

A. He was a mathematical instrument maker in Glasgow; and having undertaken to repair a model engine for the University, he observed, with surprise, the degree of heat given by steam to cold water.

Q. How did he avail himself of this fact?

A. He noticed it to Dr. Black, who had before made the discovery of latent heat, which explained the mystery; and this induced him to make further experiments, which resulted in removing many of the defects then existing.

Q. What is latent heat?

A. That degree of heat concealed, as it were, not felt, in water, which keeps it in a liquid state; if this be drawn out, the water becomes ice.

Q. Is the steam-engine extensively useful?

A. Yes; it is the most useful machine that has been invented, not only in facilitating the transport of passengers and goods by sea and land, but in its adaptation alike to the most delicate as to the most Herculean operations.

Q. Can you name some of them?

A. It can in a few minutes beat masses of iron into thin sheets, or embroider muslin; it can forge anchors, or spin the finest threads.

Q. What is the difference between high and low pressure steam?

A. In high-pressure engines, the steam is not condensed; but, after having acted on the piston, is allowed to blow off into the air: whereas, in low-pressure engines, it passes into a separate vessel, where it is condensed, on which account, as well as others, low-pressure engines do not suit a railroad.

Q. What is a locomotive engine?

A. One which moves along the road instead of being fixed.

Q. How is the power of steam calculated?

A. By that of a horse: every nineteen cubic inches of water produces twenty feet of steam, which is equal in expansive power to the force of one horse: in general, a ton of coals works one hundred-horse power for four hours.

Q. Which are the six mechanical powers?

A. The first is the lever; that is, a firm straight bar of wood or iron, where one end is put under an object to be raised, and pressed against another part, which forms a fulcrum.

Q. What is a fulcrum?

A. The prop, or support, on which

a lever rests, as the bar of the grate, when a poker is used to raise the coals.

Q. Is the balance similar to the lever?

A. Yes; it is a peculiar application of the lever, by which it is rendered useful in determining the difference or equality of weights in heavy bodies.

Q. What is the second power?

A. The inclined plane: it is a plane inclined to the horizon, or making an angle with it; its common application is to elevate bodies which are raised perpendicularly, as they are moved up the plane.

Q. What is the third power?

A. The screw, which consists either of a spiral thread twisted round a cylinder, or a spiral groove cut into it.

Q. What do you mean by spiral?

A. Twisted from one end to the other, as the corkscrew.

Q. What is the Archimedes screw?

A. A kind of spiral pump: it takes its name from its inventor.

Q. Who was he?

A. A famous geometrician of Syracuse, a sea-port in Sicily.

Q. Is that a very ancient place?

A. It must be so; for we hear that the Temple of Minerva, now used as a cathedral, was erected there 700 years B.C.

Q. What is the fourth mechanical power?

A. The wheel and axle.

Q. How are they applied?

A. The wheel is simply a wooden or metal cylinder, revolving on an axis.

Q. What is an axis?

A. A piece fixed to the centre of the wheel, which acts as a fulcrum. Then comes the wedge.

Q. What is that?

A. A piece of wood, metal, or anything that is thick at one end and sloped to a thin edge at the other.

Q. What is the sixth mechanical power?

A. The pulley; a wheel with a groove round it, turning on an axis, by which it can be hung up.

Q. What is its use?

A. By means of a line passed over the groove, a much greater weight can be raised than can be done by the hand.

Q. What are Artesian wells?

A. Wells obtained by boring a small

hole through ground where there is no water, till the perforation reaches a porous gravel-bed containing water.

Q. How does it rise?

A. By hydrostatic pressure, through pipes let down to convey it to the surface.

Q. From what do these wells take their name?

A. From having been much used in Artoise, the ancient Artesium.

Q. What are hydrostatics?

A. A science which treats of the weight, motion, and equilibrium of fluids, particularly of water.

Q. Can you mention some instance of the use of water as a mechanical power?

A. The hydraulic press is a remarkable example of the power of water; by its means a single gallon of water may be made to perform what cannot be accomplished by the strongest metal, except at enormous cost and labour.

Q. How is the power obtained?

A. The water must be confined within materials of great strength, and an attempt made to compress it into less than its natural bulk. The liquid, to avoid

compression, will repel whatever movable object is presented to it.

Q. For what is it used?

A. It is employed for extracting oil from linseed; also by paper-makers, printers, and manufacturers of various goods, for the purpose of giving a high degree of pressure and smooth glazed finish.

Q. What are aqueducts and viaducts?

A. Aqueducts are channels to convey water, and viaducts more properly mean raised ways to conduct carriages over water or marshy lands, or through hills.

Q. These are frequently made of bricks; can you tell me how these bricks are formed?

A. They are made of clay, shaped in a mould, and burnt in a kiln, or clamp.

Q. What is a kiln?

A. A large oven for burning or heating anything, and a clamp is formed of the bricks themselves, with the ends laid one over another, and a space left for the fire to ascend through them.

Q. Did the Romans use bricks?

A. Yes; but of a different size and shape to ours: in Rome, Egypt, Babylon,

and Greece, the bricks were mixed with chopped straw, and hardened in the sun.

Q. Can you name one of the most remarkable brick and tile manufactories?

A. That at Inzersdorf, in Austria, covers an area of 265 acres, and 680 acres have been purchased to secure materials for it.

Q. What are fire-bricks?

A. The Windsor bricks, or fire-bricks, are generally made of Stourbridge clay, and it is usual to mix the clay with a quantity of old fire-brick, crucibles, or glass-pots, reduced to powder.

Q. What are fire-bricks used for?

A. For coating furnaces, lining the ovens of glass-houses, when they stand the utmost fury of the fire.

Q. What are tiles?

A. Thinner bricks for roofing and paving.

Q. What is engraving?

A. The art of cutting on copper, steel, &c., with what is called a needle, or a graver, any figure or landscape which you may wish to represent.

Q. What is a needle and a graver?

A. They are steel instruments of dif-

ferent degrees of fineness for various parts of the work.

Q. Is not this art said to have been discovered by accident?

A. Yes; it is ascribed to a goldsmith of Florence, who, having placed a sheet of oiled paper under a plate of silver that was engraved, by chance laid a heavy weight upon it, and was surprised to find a complete impression of the plate upon the paper.

Q. Was not copper-plate printing discovered in a similar manner?

A. Yes; in 1460 a goldsmith in the same city happened to pour some melted sulphur on an engraved plate, and found the exact impression of the engraving left in the cold brimstone, marked with the black taken out of the lines by the liquid sulphur.

Q. What use did he make of this discovery?

A. He attempted to do the same on silver plates, with wet paper, by rolling it, and succeeded; hence the principle of the rolling press.

Q. When was the art applied in England?

A. Not before the reign of James the First.

Q. What is lithography?

A. It is drawing upon a surface of stone with a greasy composition, formed of tallow, bees wax, shellac, and common soap, which will not unite with water. Previous to being printed the stone is wetted, and thereby prevented from receiving the ink except on those places covered with the composition: the print is obtained by pressure.

Q. Where are the stones procured which are best adapted for lithography?

A. From quarries on the banks of the Danube, in Bavaria.

Q. What is mezzotinto?

A. A peculiar kind of engraving, so called from its resemblance to drawings in Indian Ink.

Q. What is glyphography?

A. It is an art by which a drawing and an engraving are made upon a copper plate by one operation.

Q. How is this effected?

A. The plate is covered with a composition upon which the drawing is made,

it is then exposed to the action of a galvanic battery, and a copper surface, with the drawing on it, is obtained, which can be printed in the same manner as a wood block.

Q. What is chromography?

A. An art by which you engrave and colour your picture at the same time.

Q. Who first took the name of Bankers in England?

A. The goldsmiths, in the reign of Charles the Second.

Q. What is a bank?

A. A commercial institution, established by private individuals or joint-stock companies, for the deposit of money and issue of notes.

Q. How do the bankers gain by these transactions?

A. They employ the money deposited with them, by lending it out at a certain rate of interest on government or other securities.

Q. Where was the first bank established?

A. In Venice, about the year 1157.

Q. What did it take its name from?

A. *Banco*, which is Italian for the

bench on which the people sat to pay and receive their money.

Q. When was the Bank of England established?

A. In the reign of William and Mary; it was projected by William Paterson, a Scotchman. Its original capital, £1,200,000, was lent at interest to the government, which was at that time embarrassed.

Q. What was the buffet?

A. It was anciently a small closet, separated from the rest of the room by slender wooden columns, to hold china, glass, &c., and some one stood there to take charge of it.

Q. What were these people called?

A. Buffetteers, now corrupted into beef-eaters; some of whom may still be seen, in the original style of dress, at St. James's Palace, London.

Q. What are statues?

A. Figures formed by the chisel, of various substances, as marble or stone; sometimes they are cast in moulds, from plaster of Paris or metal.

Q. Who is said to have invented statuary?

A. Dædalus; but there were statues before his time. It is said that his statues seemed to be endowed with life. He was the inventor of the wedge, axe, and many other mechanical instruments, and the sails of ships.

Q. How are pencils made?

A. There are two sorts of pencils: those commonly so called are made of wad, or plumbago, placed in a groove between two semicircular slips of cedar; but the introduction of the ever-pointed pencils has much lessened their use.

Q. Of what is the other kind made?

A. The other sort is the small brush used by painters, and made of the hair of the camel, badger, and squirrel, or the down of swans, inserted into a quill.

Q. Is the hair and down which you have mentioned, sometimes used for ladies' dresses?

A. Yes; except the camel's, which is woven into shawls and other articles, and called furs.

Q. Is swan's-down much prized?

A. It is, on account of its delicate whiteness; but it is not so valuable as

the trimming made of the downy grey feathers of the paddy bird.

Q. Why is it called the paddy bird?

A. From flying about the rice fields, which is called *paddy* in India.

Q. Is this anything like the fur of the chinchilla?

A. It is, but much longer and lighter-looking.

Q. What is the chinchilla?

A. A little South American animal, in size and form resembling a rabbit, with a tail which turns up, something like that of a squirrel.

Q. Are there any animals of the weasel kind whose fur is valuable?

A. Yes; that of the martin, in Canada, whose fur is of a rich blackish tawny colour; and the sable, whose skin is much prized.

Q. What colour is the latter?

A. Generally of a deep rich brown, nearly black at the ends; they are in the highest perfection between November and January. The chace for them is attended with great danger and privation, owing to the intensity of the cold at that season in the northern regions.

Q. Where is it found?

A. In the north of America, Siberia, and Kamschatka.

Q. Is there any other?

A. Yes, the ermine or stoat; a pretty creature found in Russia, Siberia, and Norway; the winter fur of this animal is highly valued, as it is used for lining the robes of our Sovereign and nobles.

Q. Why do you say the winter fur?

A. Because it is neither so thick nor so beautiful in summer as in winter, when it is snow-white, excepting a black tip to the tail; and indeed, most wisely and kindly has it been ordered, that the fur of all animals should become adapted to the climate and season for which they are required.

Q. In what way is the winter's whiteness of the ermine's fur and of the Ptarmigan's plumage adapted to the cold climates?

A. Because white surfaces do not radiate so much heat as black.

Q. What are carpets made of?

A. Worsted, woven in various ways in different countries.

Q. Which are the best?

A. Those made in Turkey are the thickest and softest, the pile which rises up from the groundwork being left very long; but the Persian carpets are the most beautiful.

Q. Have carpets been long used in England?

A. No; formerly small pieces were laid on stools and tables, but the floors used to be strewed with rushes; and in Edward the Second's time, Thomas à Becket was reproached for extravagance in having fresh rushes every day.

Q. Are carpets now made in England?

A. Yes; a manufacture of them, after the manner of Chaillot, was introduced into London in 1750, and we have now carpets made at Axminster, Wilton, Kidderminster, Leeds, and in other places.

Q. What is bunting?

A. The thin woollen stuff of which the colours or flags and signals of ships are made.

Q. What was wager of battle?

A. A trial by combat anciently allowed by our laws, where the person accused might claim a right to fight with the ac-

cuser, and if he conquered, it was received as a proof of his innocence.

Q. What was the origin of our post-office?

A. The conveyance of public despatches by the government.

Q. In what way were letters sent when conveyances were slow and few?

A. By running footmen: some of these men would run 60 miles in one day. They carried a long pole to enable them to leap over ditches and brooks, and in the knob at the head was a potion of white wine and egg, with which to refresh themselves.

Q. Was there any other mode of transmitting news?

A. Yes; the chief newsman was the ballad hawker, who perambulated the country narrating, in a sort of recitative, some glorious victory, as of that over the Dutch Fleet in 1665, which is still extant.

Q. When was the first office for letters established?

A. In 1635, by Charles I.; but that was only on the principal roads, and the

post-masters were obliged to furnish horses at twopence half-penny a mile.

Q. Who are the post-masters?

A. Officers who have the superintendence and direction of a post-office.

Q. What was the next improvement?

A. That in 1649, when means were taken to send letters weekly to all parts of the kingdom.

Q. When were post-offices established more like those existing now?

A. In 1657; but in 1784, these posts for the letters, &c., which were then sent on horseback, were so inferior in speed to the coaches, that whilst a journey from London to Bath was made by the diligence in seventeen hours, the post took forty!

Q. What did that lead to?

A. Government agreeing with coach proprietors to carry the post; letters were then charged according to the distance they had to be sent.

Q. When was the act passed which enables us to send what we please, under half an ounce, for a penny?

A. In 1839; but government has reserved to itself the right of altering this

plan at any time, if it be not found to answer.

Q. What is a tunnel?

A. A subterranean passage, sometimes cut through a hill to allow a canal or rail-road to pass.

Q. Was the Thames Tunnel a most extraordinary undertaking?

A. Indeed it was, and one which required much skill, industry, and perseverance, to bring it to perfection.

Q. What was the chief difficulty?

A. To prevent the water breaking in, which it did more than once.

Q. How were the workmen employed upon it, protected from the falling soil?

A. I believe Mr. Brunel took a hint from the natural covering of the Teredo worm, and formed a similar moveable shield.

Q. Was this tunnel thought to be the first ever made under a river?

A. It was; but Diodorus Siculus describes one made by Semiramis under the river Euphrates, between three and four thousand years ago.

Q. Was that constructed in the same manner?

A. No; for she turned off the water into an immense reservoir, and then built an arched passage across the bottom.

Q. How long did the work take to accomplish?

A. Two hundred and sixty days. She could pass by it from the palace at one end to that on the other without crossing the river.

Q. What is a curate?

A. A clergyman who does duty for the rector or vicar, and receives a salary from him.

Q. What is a vicar?

A. The incumbent, or holder of a living, but one who only receives the small tithes, the larger ones having been appropriated to some other purpose, generally given to a layman.

Q. What is a layman?

A. Any one who is not a clergyman.

Q. What is a rector?

A. A clergyman who receives all the tithes.

Q. What are tithes?

A. The tenth part of the annual increase arising from the profits of land and

stock, allotted for the maintenance of the clergy.

Q. What is meant by commutation of tithes?

A. The conversion of tithes into a rent-charge, payable in money, and chargeable on the land.

Q. What is glebe land?

A. A portion of meadow or pasture land belonging to a parish church or ecclesiastical benefice.

Q. What are the great tithes?

A. They consist chiefly in corn, hay, and wood; other articles are comprehended under the name of small tithes.

Q. What foundation was there for this law?

A. We may trace it in the Bible, where Abraham is said to have paid tithes to Melchisedec.

Q. But is it not a hardship for landowners to have to pay these tithes?

A. No; because the land was originally purchased or rented, having this charge for tithes upon it, and would have been valued higher had it not been so.

Q. Did the custom of paying tithes

prevail amongst the heathens as well as amongst Christians?

A. Yes; the Babylonians and Egyptians gave their kings a tenth of their revenues; the Romans offered a tenth of all they took to their gods; and the Gauls likewise gave a tenth to their god, Mars.

Q. What is phrenology?

A. A science which professes to discover the intellectual, sentimental, and animal propensities of a person, by the form of his skull and the variations on its surface.

Q. Was there not a system once for judging people from their features?

A. Yes; it was invented by Lavater, and called physiognomy?

Q. What is a zone?

A. Part of the earth marked on the artificial globe, as between two of the circles.

Q. How do you mean?

A. There are two frigid zones; the north frigid zone, from the north pole to the small circle around it, called the arctic circle; and the south frigid zone,

from the south pole to the circle marked round that, and called the antarctic circle.

Q. Are there other zones?

A. Yes; the torrid zone, which extends over the centre or hottest part of the globe, from the circle called the tropic of Cancer on the north, to the tropic of Capricorn on the south.

Q. What are those called which lie between the tropics and the circles?

A. Temperate, from never being either so hot as the torrid, or so cold as the frigid zones.

Q. What are the antipodes?

A. That part of the globe which is immediately under us, and where the days and nights are exactly the reverse of ours.

Q. What are hemispheres?

A. Half the globe, or sphere; the equator just cuts the globe in two; so does every great circle.

Q. Which are the other great circles?

A. The ecliptic, which points out the sun's apparent path in the heavens, and the colures.

Q. Where do they go?

A. One of them through the poles, and through the equinoctial points, Aries and Liber; the other through the poles, and then through the solstitial points, Cancer and Capricorn.

Q. Why are these called equinoctial and solstitial points?

A. The equinoctial is marked on the globe as the time in which the days and nights are of equal length. The solstitial, when the day is the longest to that part of the world: but to know these, we must be acquainted with the signs of the zodiac, and their places on the globe.

Q. How many signs are there?

A. Twelve: Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, and Pisces.

Q. What do you mean by latitude?

A. The distance of any place from the equator, north or south.

Q. What by longitude?

A. The distance east or west of any place, from any other which may be fixed upon: our longitude is measured from Greenwich.

Q. Why did you say the sun's *apparent* path in the heavens?

A. Because it is not the sun which moves, but the earth.

Q. Was this always thought so?

A. No; in ancient times it was believed that the sun went round us in four and twenty hours: Galileo, an Italian astronomer, was imprisoned for daring to assert the contrary.

Q. When was the truth declared?

A. The true solar system was established by Copernicus, a Prussian, who was born at Thorn, in 1472.

Q. What is the solar system?

A. It derives its name from *sol*, the sun, around which the planets and comets are continually moving.

Q. Have there been any new discoveries made since then?

A. Yes; by Sir Isaac Newton, Dr. Herschel, and others; and, as instruments are enlarged and improved, further discoveries will in all probability continue to be made.

Q. How do you distinguish a fixed star from a planet?

A. The light of the planets is steady,

like that of the moon; whilst that of the stars is always twinkling, and not so bright.

Q. What is an eclipse?

A. When the moon passes between the earth and the sun, so as to intercept its light, the sun is said to be eclipsed; and this can occur only when it is *new* moon, or when the moon, at its conjunction, is in or near one of its nodes: an eclipse of the moon is occasioned by the passage of the earth between it and the sun, the moon thus becoming immersed in the earth's shadow; this happens only at *full* moon.

Q. When is the moon in conjunction with the sun?

A. When they meet in the same point of the ecliptic, which happens every month.

Q. What do you mean by the moon's nodes?

A. The two points in which its orbit intersects the ecliptic: they are called the ascending and descending nodes.

Q. Were not the heathens often alarmed at the appearance of eclipses?

A. Yes; till the cause was known.

they were believed to shew the anger of their false gods; and sacrifices, often human, were offered to appease them.

Q. This reminds me that fire used to be brought from the sun to re-kindle the flame on the altar of the goddess Vesta, whenever it had been extinguished. Can you tell me how it was obtained?

A. Yes; by means of a burning lens.

Q. What is that?

A. A mirror, or speculum, which brings the rays of light that fall upon it into so small a space, that they kindle any combustible matter coming in their way.

Q. Were these, then, used by the ancients?

A. Yes; the burning mirrors of Archimedes and Proclus are famous.

Q. What did they do?

A. That of Archimedes set on fire the Roman ships at the distance of a bow-shot; and that of Proclus, according to Zonaras, consumed the navy of Vitellius.

Q. What was the effect of one of the largest burning mirrors that have ever been constructed?

A. It melted a piece of Pompey's-

pillar in less than a minute; a piece of cast iron in a quarter of a minute; a halfpenny in 16 seconds; and fragments of slate or tile in 3 or 4 seconds.

Q. How many times did it increase the intensity of the sun's heat?

A. 17,000 times.

Q. Do accidents ever arise from the rays of the sun passing through glass?

A. Yes; but it must be in a globular shape to condense them, and either solid in itself, as in what is called the bull's eye in a pane of glass, or as in a bottle filled with water, which has the same effect.

Q. Have things been burnt by these means?

A. Yes; tables have been scorched on which glass globes containing gold fish have been placed, and other articles have been burnt by being incautiously placed under sky-lights containing bull's eyes.

Q. What are these bull's eyes?

A. They are the thick pieces that adhere to the tube through which the glass is blown.

Q. Do the moonbeams give out heat like those of the sun?

A. Experiments have been made to concentrate the moonbeams upwards of 300 times, by means of a burning glass nearly 3 feet in diameter, and yet the most delicate thermometers have shewn not the least increase of temperature.

Q. Does every thing that gives light to the earth radiate heat also?

A. Yes, in some degree; the fixed stars, which are suns like ours, give off heat, as well as light, but the temperature maintained in the realms of space is calculated to be as low as that at which quicksilver freezes.

Q. What other sources of heat besides celestial ones, does the earth possess?

A. The most important of these is subterranean heat; by careful experiments it has been discovered that, in our climate, the temperature increases one degree for every 50 feet that we go down.

Q. Can you give me any instances of this heat?

A. In the "United Mines" of Cornwall, one of the levels is so hot, that though a stream of cold water is allowed to flow through it, the miners are compelled to work nearly devoid of clothing;

and at another mine in the same county, the temperature is greater than the intensest heat in summer.

Q. Will you name some other instances?

A. The Geysers, or boiling hot springs of Iceland, in which eggs have been cooked in four minutes; those of Carlsbad, in Bohemia, and of Bath, in our own country.

Q. Can you tell me of any other instances of subterranean heat?

A. The volcanoes, or burning mountains, manifest it: in the eruption of an Icelandic volcano, in 1783, a large river entirely disappeared, being filled by a torrent of burning lava, which even overflowed the channel of the stream, though in many places 600 feet deep, and 200 broad.

Q. Is there any other source of heat?

A. One of the *natural* sources of heat to the earth is found in the electric discharges known as forked and sheet lightning.

Q. How can you shew that they contain heat?

A. By their effects: the electric flash

will fuse metals, inflame decayed trees, and fuse even rocks themselves.

Q. Can we procure any artificial heat so powerful as that of electricity?

A. No; it exceeds that of the strongest furnaces; platinum melts like wax before it, though it remains infusible in a forge at a white heat.

Q. What mechanical sources of heat are there?

A. Those of percussion, friction, and pressure.

Q. Can you give an instance of heat produced by each of these means?

A. The blacksmith hammers a nail until it is red hot; the Indian ignites two pieces of wood by rubbing them together; and in coining the blank metal becomes greatly heated by the action of the press.

Q. Is there any other mode of producing heat?

A. Yes, that of chemical action; thus, if four parts of strong oil of vitriol be mixed with one part of snow or pounded ice; the heat developed is sufficient to boil water.

Q. What is the most ordinary mode of obtaining heat?

A. That of combustion, which is a chemical combination, giving out heat and light.

Q. Are all bodies combustible?

A. No: the term combustible is applied to all bodies capable of being burnt in atmospheric air, or in oxygen gas.

Q. When were umbrellas first introduced?

A. They were introduced into London about 1775, and the hackney-coachmen complained much that they would spoil their trade.

Q. Where were they brought from?

A. From Asia, and their name means, a little shade.

Q. When were coaches used in England?

A. They are said to have been introduced in 1564, by William Boomen, a Dutchman, who was Queen Elizabeth's coachman: but some sort of carriage had been in use before that, and called a whirlicote.

Q. When did hackney-coaches take their stands in the streets of London?

A. About 1625; there were only 20;

in 1715, the number was limited to 800; now there are upwards of 1,100.

Q. What is a microscope?

A. An optical instrument, by which objects are seen highly magnified, or increased in size.

Q. What is the solar microscope?

A. A microscope connected with a reflector and conductor; the first throws the sun's rays on the latter, by which they are condensed, to illuminate the objects to be examined.

Q. What is a lucernal microscope?

A. Upon the same principle, except that a lamp is used instead of the sun.

Q. What is a telescope?

A. An optical instrument, employed in viewing objects at a distance; first used in the 16th century, without the aid of glasses.

Q. Who first used glasses?

A. Galileo, whilst at Venice, heard of a glass made in Holland; and, grinding two glasses, he fitted them to the ends of an organ pipe, the effects of which so much astonished him, that he went on improving the instrument.

Q. Has there been much done since then?

A. Yes, indeed; Herschel completed one on the 28th of August, 1798, which was called *gigantic*, and through it, on the same day, was discovered the sixth satellite of Saturn: a still more enormous one has been constructed under the direction of Lord Rosse.

Q. When were watches invented?

A. About the year 1500; but they have been brought to the highest perfection by the Swiss.

Q. When were they first made in England?

A. Not more than two centuries ago; they at first went on catgut instead of steel chains.

Q. What is the difference between a watch and a clock?

A. A clock goes by a pendulum, as a watch goes by a spring.

Q. Who first thought of a pendulum?

A. Galileo, who observed a lamp in a church, at Pisa, which after being disturbed, continued to vibrate long, and very regularly.

Q. What is a stereoscope?

A. An optical instrument, which enables us to look upon two different pictures taken under a slight difference of angle, each eye looking upon one picture only: thus, as in ordinary vision, the brain perceives two pictures as one, the objects being represented under a high degree of relief.

Q. What other recent discovery has been instrumental in leading to the almost universal use of the stereoscope?

A. That of Photography, or the art of taking pictures by means of light, on a prepared surface of metal, paper, glass, &c.

Q. How is it accomplished?

A. The material prepared is placed in a camera obscura, which is adjusted so as to be opposite to the object to be copied, an image of which is delineated on its surface.

Q. Is that all that is necessary?

A. No; the picture has then to be subjected to a developing process, which brings out the lights and shades, another process being necessary to render them permanent.

Q. What preparations have been found

the most useful in producing such wonderful effects?

A. Various compounds of silver, which render the metal, glass, or paper, peculiarly sensitive to the action of light.

Q. Are birds of prey very useful?

A. Yes; by clearing away all the remains of animal substances, which, if left to decay, would infect the air with offensive matter.

Q. Are the aquiline vultures protected in Egypt?

A. Yes; on this account any person destroying them was, formerly, punished with death.

Q. Are they useful on other accounts also?

A. Yes; they devour the eggs and young of reptiles, rats, and mice, which abound in the mud in all the ground that is fertilized by the overflowing of the river Nile.

Q. Is the carrion vulture protected in America for the same services?

A. Yes; and there they devour the eggs of the alligator.

Q. Are eagles of use?

A. Yes; the vulturine eagle, a na-

tive of Caffraria, feeds principally on carrion.

Q. Were hawks formerly in great repute in England?

A. Yes; hawking was a sport much practised in Europe and Asia in the chivalric ages, and continued in favour till the 17th century.

Q. In what did this sport consist?

A. In pursuing smaller birds with a falcon, or hawk, taught to seize them.

Q. Were falcons ever used to attack animals as well as birds?

A. Yes; in Persia they are used in hunting the gazelle, and in this way, wolves were formerly hunted in Europe.

Q. To what division do the birds used for this sport belong?

A. To those called Raptores, that is, robbers or plunderers: the kinds most commonly used are the Peregrine or common falcon, the Ger-falcon, the Hobby, the Merlin, &c.

Q. Was every one allowed to use them?

A. No; only persons of rank. The length of time that was required to train a falcon, and the consequent expense of procuring one, confined this fashionable,

but cruel sport, to the wealthy: the common falcon was never flown by any one below the rank of a prince.

Q. What put an end to the amusement of hawking?

A. The use of gunpowder, which by degrees superseded hawks.

Q. Who invented, or rather discovered, the properties of gunpowder?

A. It is said to have been used in China at a very early period; but it was only in 1280, that Roger Bacon thought it possible to apply it to the purposes of war.

Q. Of what is it composed?

A. Nitre, sulphur, and charcoal, in different proportions.

Q. Is this mixture highly combustible?

A. Yes; and when ignited gives rise to great expansive force and explodes with intensity: the idea of using it for propelling bodies to a distance was caused by its doing so accidentally, in the laboratory of Bartholomew Schwartz, a German monk.

Q. What is a laboratory?

A. A workshop, fitted up with all

the apparatus necessary for a practical chemist.

Q. What is a chemist?

A. One who investigates the changes which combination produces in the properties of bodies.

Q. What are elements?

A. Elements are bodies which the utmost skill and power of the chemist has hitherto been unable to resolve into any other forms of matter.

Q. What was considered formerly to be the number of the elements?

A. Four; fire, air, earth, and water: but the last three have been decomposed, and fire is discovered to be the result of intense chemical action.

Q. I know sponge is much used in the arts; what is it?

A. It was formerly thought to be a marine substance adhering to rocks; but from the patient and careful observations of Professor Grant, it is finally classed amongst the animal creation.

Q. What account does he give of it?

A. He says, that having placed a piece of live sponge under the microscope, he beheld the splendid spectacle of a living

fountain, vomiting forth from a circular cavity, an impetuous current of liquid matter, which continued without change or diminution for twenty-five minutes.

Q. Where does it come from?

A. Principally from the Mediterranean, particularly from Nicaria: a finer sort is brought from Constantinople, and the coarsest from the coasts of Barbary.

Q. What makes it so very useful?

A. Its powers of absorption, or taking up liquids.

Q. How is it procured?

A. By divers.

Q. Was coral once thought to be a vegetable substance?

A. Yes; but it is now ascertained to be a mass of animals, which, being attached to a rock, grows downwards.

Q. How is it procured?

A. Eight good divers take a boat, and carry with them a large wooden cross, to each arm of which hangs a strong net bag, which is let down into the sea; a diver follows, pushes each of these arms into the hollows of the rock, so as to entangle the coral in the nets, then his

comrades pull up the cross with all attached to it.

Q. What is alum?

A. A fossil salt and mineral.

Q. Are there two sorts?

A. Yes; the natural alum, found in Egypt, Sardinia, Spain, and Bohemia; also in Yorkshire and Lancashire in England.

Q. How is the other kind procured?

A. From alum slate, by a chemical process.

Q. In what is it used?

A. In the arts, mechanics, and medicine.

Q. What is aqua fortis?

A. The common name of nitric acid.

Q. What is tartar?

A. An acid salt, which is deposited on the sides of large vessels filled with wine; it is purified by boiling in clear water, with the addition of a small quantity of fine clay.

Q. What is cream of tartar?

A. The parts which crystalize upon the liquor when purifying, after the liquor containing the tartar is evaporated.

Q. What is emetic tartar?

A. The acid of tartar mixed with antimony.

Q. How is æther obtained?

A. By distilling acids with rectified spirits of wine.

Q. What is spirits of wine?

A. All fermented liquors when distilled yield a spirit, which is purified by frequent distillation, and it is then called spirits of wine.

Q. What is putty?

A. A paste, made of whiting, linseed oil, and white lead; it is used by glaziers, and also by painters.

Q. What is emery?

A. A rich iron ore; that is, an ore with much iron in it, found in large masses, and is very hard and heavy; it consists of alumina, silica, and iron.

Q. How is it used?

A. In the form of a powder, for polishing hard minerals and metals: the lapidaries cut ordinary gems on their wheels, by sprinkling them with the moistened powder of emery.

Q. When were pins first made in England?

A. It is difficult to determine; but they are first noticed in the statutes, or law books, in 1483, and described, in Henry the Eighth's time, in a manner which seems as if they had been but lately made here. Pins, brought from France, 1543, were first used in England by Catharine Howard, Queen of Henry the Eighth.

Q. Were they deemed a great luxury in Paris at that time?

A. Yes; and they were only allowed to be openly sold on new year's eve and new year's day: they were often given as new years' gifts, from whence arose the name of pin-money, a term now often given as an allowance for a wife's private expenses.

Q. What are pins made of?

A. Brass wire: iron was formerly used, but that was very injurious.

Q. How are they made?

A. The wire is straightened, and cut in lengths, then sharpened at each end, and again cut to the proper size.

Q. How are the heads formed?

A. By spinning a fine wire round one the size of the pin; this wire is then drawn

out, leaving the fine wire in the form of a twisted tube, of which two turns is cut off to form the head; and this is put on to the pin by children.

Q. How are they cleaned?

A. By being boiled in a solution of tartar, sour beer, or wine lees.

Q. How are they whitened?

A. By being boiled with grain tin; they are then polished, by being shaken in coarse bran, and are then papered.

Q. How many are calculated to be daily used, or exported?

A. Fifteen millions! and each requires fourteen distinct operations; but many inventions have been employed to make them partly by machinery.

Q. What could have been used before pins were invented?

A. Skewers, bodkins, brooches, and strings; in some places, fish-bones and thorns.

Q. Were needles made here so early as pins?

A. No; they are said to have been first made here by a native of India, in 1545, and when he died the art was lost.

Q. Who recovered it?

A. Christopher Greening, who, with his three children, were settled by Mr. Damer, ancestor to the present Earl of Dorchester, at Long Crendon, in Buckinghamshire, where the manufactory was established.

Q. Where does the best wire for making them come from?

A. Germany and Hungary.

Q. How are they made?

A. The wire is heated, and passed through different sized holes, then flattened at one end, and the eye punched out.

Q. What is next done?

A. They are heated, and cooled in water, then heated again and straightened.

Q. How are they polished?

A. By being rolled up in buckram with emery and oil of olives, and having a thick board loaded with stones worked backwards and forwards over them for two days.

Q. Has any method been invented for making them by steam?

A. Yes; Mr. Cocker, of Sheffield, has shewn that a steam-power machine may

be worked to produce 14,000,000 per week, at a cost of a penny a thousand!

Q. Have any sewing machines been invented?

A. Yes; in France, England, and America; by means of which, both embroidery and plain sewing can be accomplished at the rate of from 200 to 500 stitches in a minute.

Q. Is brocade worked by hand?

A. No; that is a stuff of gold, silver, or silk, raised and enriched with flowers, or other ornaments, in the weaving.

Q. What is tapestry?

A. A curious production of the loom, and consists of woven hangings of silk or wool, often with landscapes and figures upon it.

Q. Has this art been long known?

A. From a very remote period indeed amongst the eastern nations; the English and Flemish are supposed to have learnt it from the Saracens.

Q. Were the celebrated cartoons, or designs of Raphael, drawn as patterns for tapestry?

A. Yes; for some woven at Arras, in Flanders.

Q. Who established the Gobelin manufactory of tapestry in the neighbourhood of Paris?

A. Colbert, the celebrated minister of Louis XIV.

Q. What was the name derived from?

A. Two brothers, who there discovered a beautiful scarlet dye, since known by their name.

Q. Was tapestry sometimes worked by hand?

A. Yes; and there is one piece much celebrated, and believed to be the work of Matilda, the wife of William the First: it represents his conquest of England; it is kept at Bayeux, and called the *Bayeux* tapestry.

Q. What is meant by embalming?

A. The art of preserving dead bodies from decay, by filling them with drugs and spices.

Q. Is this a very ancient practice?

A. Yes, amongst the Egyptians, who are supposed to have adopted it from an idea that the soul continued with the body so long as it remained perfect.

Q. You spoke of the goddess Vesta; what did you mean?

A. The heathen nations could not imagine all the attributes and perfections united in one Being, and therefore fancied there must be a separate god or goddess to each.

Q. How many then did they make?

A. It would be quite impossible to count them; but there were four orders: the first consisted of twenty, who were called superior gods of nations; twelve of these formed the council of Jupiter, he being one and the head of them.

Q. What were the other eight?

A. Still superior gods of the first order, but not in the council.

Q. What was the second order?

A. That was very numerous, and those who belonged to it were called inferior gods of nations.

Q. Who composed the third order?

A. The demi-gods; that is, half-gods, those who were supposed to have had a god for a father, or a goddess for a mother; or else they were men who had made themselves great by their valour, and were placed among the gods after their death.

Q. What was the fourth order?

A. The virtues, and even the miseries of men; as Prudence, Concord, Poverty, Pain, &c.

Q. Were there any other divinities?

A. Yes, of the seas and rivers, of the earth, and even of the infernal regions, as they were called, the place to which the spirits of all men passed when they died.

Q. Did they believe that the good and the wicked went to the same?

A. Yes, to be judged by the three Judges: Minos, Eacus, and Radamanthus, by whom they were either condemned to Tartarus, to suffer the punishment of crime, or admitted to the Elysian fields, to receive the rewards of virtue.

Q. Will you tell me the names and attributes of some of the principal gods and goddesses?

A. Neptune was god of the sea; Mercury, of the fine arts and sciences; Mars, of war; Vulcan, of fire and of the art of working in metals; Apollo was the god of music, physic, poetry, and rhetoric; Juno, the wife of Jupiter, presided over empires and riches, and

was the protectress of married women; Ceres, was the goddess of corn and fruit; Minerva, the goddess of wisdom, came into being in an extraordinary manner.

Q. How was that?

A. Jupiter had a pain in his head, and he desired Vulcan to break it open with a keen axe, when Minerva sprang out full armed.

Q. Who was Vesta?

A. She was the goddess of fire, and of that vital heat which is the source of health and vigour.

Q. Who was next?

A. Diana; she was the goddess of the woods and of the chase: we have spoken of one of her temples, that at Ephesus, as one of the wonders of the world; you will find it mentioned in the Acts of the Apostles.

Q. This proves that men did really once believe in, and worship, these imaginary beings, otherwise we could scarcely think it possible. Who was the sixth goddess?

A. Venus, the goddess of beauty and affection.

Q. Who were the Muses?

A. Nine daughters of Jupiter, and companions of Apollo.

Q. What were their names, and what did each preside over?

A. Clio, was the muse of history; Thalia, of comedy; Melpomene, of tragedy; Euterpe, of instrumental music; Terpsichore, of dancing; Erato, of lyric poetry; Polyhymnia, of singing and rhetoric; Urania, of astronomy; and Calliope, of harmony and heroic poetry.

Q. Who were the Fates?

A. The three daughters of Necessity, who were supposed to spin and cut the thread of human life and destiny.

Q. How did these ideas originate?

A. It is probable that they were emblematical of various spiritual truths, and prevailed at a time when natural images were made use of to represent their corresponding spiritual ideas.

END.

INDEX.

Abraham, 342
Absorption, 361
Acacia, 142
Accepting Chiltern Hundreds, 309
Accidents by sun, 349
Achates, river, 83
Acid, nitric, 362
prussic, 202
Acorns, 147
bread of, 147
coffee, 147
Adamant, 72
Adularia, 88
Æther, 363
Agate, 83
Age, 311
Air, 118
Air bladder, 277
Alabaster, 104
Albion, 309
Albus, 309
Alder, 156
Ale, 205
Alkalies, 109
Alligator, 275, 357
's eggs, 275
's teeth, 275
Alloy, 26
Allspice, 178
Almonds, 202
Alphabet, 6
Altar in salt mine, 113
Alum, 362
Alumina, 132, 363
Amalgam, 50
Amber, 121
property of, 318
Ambergris, 270
Amethyst, 75, 79
where found, 75
Amphibia, 274
Anchovy, 259
Ancient & modern work, 316
Angelica, 184
Anger of false gods, 348
Anglesea copper works, 42
Angora goat, 234
Anil, 133
Animal kingdom, 314
marine, 265
propensities, 343
ruminating, 233
Anise seed, 183
Annatto, 135
Annual, 16
Anoptures, 282
Antarctic circle, 343
Antennæ, 280
what thought to be, 280
Anthrax, 77
Antidote, 108, 172
Antimonial wine, 123
Antimony, 121
oxide of, 122
Antipodes, 344
Ants, 281
Apollo, 370
Apparatus, signalling, 321
Apples, 228
bitter, 220
codlin, 228

Apple, crab, 228
golden pippin, 228
northern greening, 228
pippins, 228
red streak, 228
russet, 228
Apricot, 226
April, 312
Aqua fortis, 362
marina topas, 77
beryl, 78
regia, 33
Aquarius, 345
Aqueducts, 328
Aquiline vultures, 357
Arabic, gum, 142
Archbp. Neville's feast, 297
Archimedes' screw, 325
burning mirror, 348
Arctic circle, 343
Ariel, 133
Aries, 345
Aristocraticalgovernment, 305
Aristotle, 20
Armenia, 226
Arno river, 204
Arrack, 155
Arras, 367
Arrow root, 185
Arsenic,
Artesian wells, 326
Artichoke, 217
Jerusalem, 217
Artificial day, 313
globe, 343
Asbestos, 102
Ascending nodes, 347
Ash tree, 143
former use in Lancashire, 143
why called husbandman's tree, 143
Asparagus, 214
Asphalt, 121
Ass, 242
's milk, 243
's skin, 243
Assizes, 306
Asterias, 76
Asthma, relief of, 174
Atmosphere, 46
Attar of roses, 200
August, 312
Australia, 307
Autumn, 311
Axle and wheel, 326
Axminster, 337
Axis, 326
Azure blue, 86

Bacon, Roger, 359
Babylonian tithes, 343
Badger, 247
Balance, 325
Ball, cannon, 66
Ballad hawker, 338
Balm of Gilead, 160
Balsams, 231
copaiva, 232
Peru, 232
Tolu, 232
Balsamodendron myrrha, 231
Bamboo, 285
Banana, 170
Banco, 332
Bank, 332
of England, 333
the first, 332
Bankers, 332
Banyan, 196
cubbeir burr, 196
Barberry, 226
how poisoned, 227
Barilla, 130
Bark, oak, 146, 253
Jesuit's, 224

Bark, Peruvian, 224
Barley, 205
pearl, 206
Barm, or yeast, 206
Barn owls, 290
Barometers, 48
Bartholomew Schwartz, 359
Basalt, 99
how found, 99
Bath waters, 851
stone, 105
Battle, wager of, 337
Bayeux tapestry, 368
Bay, sweet, 165
tree, 164
Beans, 218
kidney or haricot, 219
Beavers, 248
habitations, 249
skins, 249
Bee, 278
bread, 279
cuckoo, 302
hive, 278
honey, 278
queen, 279
wax, 278
Beech, 156
mast, 157
Beef, 236
eaters, 233
Beer, 205, 207
Beet, 213
Beighton, Mr., 322
Bell-metal, 66
Benzoin, 232
Bergamot, 200
Beryl, 78
Betel, 181
Betton's British oil, 121
Bias, 315
Bible tithes, 342
Biennials, 17
Birch, 156
Bird of Paradise, 301
paddy, 335
why so called, 335
Birds of prey, 357
of passage, 283
Birmingham rail opened, 322
Birth of our Saviour, 54
Bismuth, 123
Bissextile, 311
Bistre, 136
Bisulphuret of iron, 87
Bitter almonds, 202
apple, 220
Bittern, 295
Bitumen, 120
Blackberry, 225
bird, 289
currant, 227
chalk, 95
Dr., 323
ginger, 181
grouse, 293
lead, 65
oxide, 50
pepper, 177
sealing wax, 138
squitch, 210
Bladder fucus, 129
Bleak, 260
used to make pearls, 260
Bligh, Lieut., 169
Bloaters, 258
Blood, dragon's, 232
Bloodstone, 86
Blooming, 60
Blubber, 267
Blue powder, 133
test paper, 131
vitriol, 139
Boar, 246
Board, Bristol, 5
Boat fly, 281

Bodies, organized, 127
Boiling springs, 351
Bole, 100
Bolton, 119
Bombykia, 20
Bombyx, 20
Bonnet, Dunstable, 204
Leghorn, 204
Book, what made of, 2
Booman, Wm., 353
Borax, 31
use of, 31
Borecole, 216
Borrowdale, 65
Bottles, olive green, 100
Bounty, ship, 169
Box, 162
hill, 163
Bran, 203
Brass, 43
Brassica, 216
Brawn, 246
Brazil wood, 132
Bread, acorn, 147
bee, 279
fruit, 168
taken by the Bounty, 169
Brewster, Sir D., 121
Bricks, 328
fire, 329
Roman, 328
Brilliants, 71
Brimstone, 41
Brine pits, 113
Bristles, 247
Bristol-board, 5
Britannia metal, 65
British dominions, 308
empire, 307
oil, Betton's, 121
Brocade, 367
Brocoli, 216, 223
Bronze, 66
Brown paper, 5
Bruce, Robert, 251
Brunel, Mr., 340
Buffet, 333
Buffetteer, how changed, 333
Bull's eye, 349
accidents caused by, 349
Bullace, 226
Bunting, 337
Burchell's Zebra, 244
Burgundy pitch, 153
Burning well, 126
lava, 351
lens, 348, 350
mountains, 84
in France, 352
Bustard, 303
Butter, 236
called in India, 237
different methods of making, 237
how used by the Romans, 273
Butterfly, 281

Cabbage, 216
Caffraria, 358
Cairn gourms, 81
Caius, Dr., 273
Cake, oil, 10
Calamine stone, 43
Calcareous earth, 104
Calcined, 25
Calendar months, 311
Calf's stomach, 237
Calico printing, 142
Caliope, 372
Calomel, 50
Calx, 25, 56
Calyx, 178
Camel, 240
milk, 241
Camera obscura, 356

Camlet, 234
Camomile, 223
infusion, 224
Camphor, 164
tree of Japan, 164
Canary-birds, 289
Islands, 289
wines, 198
Cancer, 345
tropic of, 344
Candles, 234, 280
Canna coccinea, 186
Cannel coal, 119
Cannon, 66
ball, 66
Cantharis, or Spanish fly, 280
Caoutchouc, 189
Capercailzie, 293
Capers, 175
Capricorn, tropic of, 176, 344
Capricornus, 345
Capsicum, 178
Caraccas, or Venezuela, 171
Carat, 69
Carbon, 67
Carbonate of lead, 139
Carbonic acid gas, 117
Carbuncle, 77
Cardamoms, 182
Cardoons, 218
Card-paper, 5
Carlsbad, 351
Carp, 259
great increase of, 259
caviare made of their roes, 260
Carpets, 336
Axminster, 337
Chaillot, 337
Kidderminster, 337
Leeds, 337
Persian, 337
Turkey, 337
Carpets, Wilton, 337
Carraway seeds, 182
Carriage grease, 153
Carrion, 289
vultures, 357
Carrots, 214
Cartoons, why drawn, 367
Cashmere goat, 234
shawls, 234
Cassava, 186
sweet, 187
Cassia, 181
Cat, 254
veneration for, 255
Catechu, 142
Caterpillar, 18
Catherine, Empress, 70
Cauliflower, 216
Caulking, 11
Caviare, 260, 277
Caxton, Wm., 8
Cayenne pepper, 178
Cedar, 152
Celestial heat, 350
Century, 311
of Inventions, 322
Ceres, 371
Cerial grasses, 203
Chaillot, 337
Chair, rush-bottom, 209
Chalk, black, 95
French, 102
hills, 204
red, 95
stratum, 83
Chalybeate, 62
Champignons, 222
Chancellor, Lord, 16
Chapel in salt mine, 113
Char, 257
Charcoal, 67, 152, 359
Charles I., 338
II., 67, 194, 332, 362

Cheese, 237
Chemical action, 352
Chemist, 360
Cherry, 225
Cheshire cheese, 237
Chess, 8
Chestnut tree, 157
horse, 158
at Tortworth, 158
Chickens hatched in ovens, 292
Chief empires, 307
Chiltern hundreds, 309
Chimney martin, 284
China orange, 200
Chinchilla, 335
Chocolate, 170
Christmas day, 314
Chromography, 332
Chronology, 310
Chrysalis, 18
Chrysoberyl, 77
Chrysopras, 85
Cicada, 281
Cider, 228
Cinchona, 244
Cinnabar, 50
Cinnamon, 180
wild, 181
Cinque ports, 309
chartered, and why, 310
Circles on globe, 344
antarctic, 343
arctic, 343
of knowledge, 1
Circuits, 308
Citron, 201
Civil year, 311
Clamp, 328
Clarence, Duke of, 198
Clay, pipe, 92
porcelain, 88
potter's, 88
Clay, slate, 95
Stourbridge, 329
Tripoli, 92
Clayton, Dr., 119
Cleobulus, 315
Cleopatra, 262
Clergy, maintenance of, 342
Clergyman, 341
Climate, 313
Clio, 372
Clock, 355
Cloth, incombustible, 103
packing, 11
Clover, or trefoil, 211
Dutch, 211
red, 211
white, 211
Cloves, 178
Clutch, 263
Coaches, 353
hackney, 353
stands, 353
Coal, 114
cannel, 119
gas, 118
origin of, 114
peat, 120
pits, 115
Cobalt, 140
oxide of, 140
Cobbett, Mr., 208
Coccinea, canna, 186
Cochineal, 136
Cocker, Mr., 366
Cockle, 264
Cocoa-nut, 155
Cocoon, 18
Coddling apple, 228
Cod fishery, 255
Coffee, 172
acorn, 147
an antidote to opium, 174

Coins, 66
gold, 67
iron, 67
leather, 66
pasteboard, 66
tin, 67
Coke, 118
Colbert, 368
Coleoptera, 281
Colewort, 216
Colliers, 115
Colocynth, 220
Colossal statue, 315
Coloured earthenware, 89
Colures, 344
Colza oil, 215
Combat, trial by, 337
Combustion, 353
Commerce, 17
Common reed, 212
juniper, 166
opal, 85
resin, 153
salt, 110
zebra, 244
Commons, the House of, 304
Commutation of tithes, 342
Comparison of ancient and modern work, 316
Compass, 63
Concord, 370
Conger, or sea eel, 276
Conjunction of sun and moon, 347
Conquest, Norman, 309
Constantine, 161
Contracting, 46
Copaiva, balsam of, 232
Copal, 168
varnish, 168
Copernicus, 346
Copper, 40
mud, 42
Copper-plate printing, 330
Coral, 361
Cordage, 17
Coriander seed, 183
Cork, 188
Corn crake, 296
Corn, Indian, 203, 208
Cornelian, 84
Cornwall, Duke of, 54
United Mines, 350
Coroner, 305
Corsellis, 8
Coster, 6
Cotton, 12
how gathered, 12
Counties, 308
Court plaster, 232
Cow, 235
horns, 235
how stained, 235
Cow-tree, or palo de vaca, 171
Crab apple, 228
Cranberry, 227
Cream, 236
of tartar, 362
Creation, 1
Creator, The, 118
Crete, labyrinth of, 316
Crickets, 281
Cristison, Dr. R., 186
Crocodile, 275
Croyden railway, 321
Crystal Palace, 69
rock, 80
Crystallized carbon, 67
silica, 79
Cucumber, 220
Cuckoo, 302
moroc, or bee, 302
Cubbeir burr, 196
Curate, 341
Curd, 237
Currants, 227

Currants, grocer's, 199
Curry powder, 136
colouring to, 135
Cuttle fish, 264
Cyclopædia, 1
Cygnets, 297
Cylinder, 322
Cypress tree, 161
durability of, 161
Cyrus, Palace of, 315

Dædalus, 334
Damaskeening, 61
Damask steel, 61
Damer, 366
Dampier, Capt., 168
Dancer, Mr., 366
Darlington railroad, 321
Date, its uses, 154
Davy's, Sir H., lamp, 39, 117
Day, artificial, 313
new year's, 311
Days in each month, 312
a week, 312
Deadly night shade, 175
December, 312
Decoction and infusion, difference of, 165
Deer, 233
musk, 239
rein, 238
use of skin, horns, bones, and sinews, 239
Demi-gods, 369
Democratical government., 305
Derbyshire spar, 104
Descending node, 347
Diamond, 68
ancient name for, 72
brilliant, 71
effect upon iron, 72
how burnt, 68
how distinguished, 71
Diamond, how first discovered in Brazil, 73
Koh-i-Noor, 69
its value, 70
names of, 70
occidental, 70
oriental, 70
Pitt, 70
powder, 71
reward for finding, 74
rose, 71
rough, 71
sparks, 73
the largest, 69
Diana, 371
Diana's Temple, 161, 315
Difference of diamonds, 71
earthenware and porcelain, 89
effervescence and fermentation, 206
galvanism and electricity, 317
gum and resin, 164
high & low pressure, 323
infusion & decoction, 165
snow and hail, 114
tame and wild swan, 297
watch and clock, 355
Diptera, 282
Divers, 361
Divinities, 370
Divisions of the earth, 306
day, 312
hour, 313
time, 310
Dogs, 251
blood-hound, 251
R. Bruce tracked by, 251
grey-hound, 252
mastiff, 251
Newfoundland, 252
Prairee, 249

Dog, shepherd's, 251
Siberian, 252
spaniel, 251
St. Bernard's, 252
terrier, why called, 252
watch, 251
Dolphin, 278
Domestic cat, 254
poultry, 292
Dominions, British, 308
Dorchester, Earl of, 366
Dotterel, 296
Down, eider, 300
Dragon's blood, 232
fly, 281
Dromedary, 240
Drones, 278
Druids, 250
superstition of the, 250
Dubois, Mr., 185
Ducks, 299
Ductile, 23
Dulse, 130
Dunstable bonnet, 204
Durable wood, 161
Dutch cheese, 238
peculiarity of, 238
clover, 211
fleet, 338
Dyeing fustian, 146

Eacus, 370
Eagle, 357
Earth, 1, 101, 306, 350
calcareous, 104
Earthenware, 88
how coloured, 89
how glazed, 88
Ebony, 157
Ecliptic 344
Eclipse, 347
Heathens alarmed by, 347
Edible frog, 276
Edward IV., 198
VI., 20
Edwards, Daniel, 174
Milne, 281
Eels, sand, 277
Effervescence, 206
and fermentation, difference of, 206
Eggs, ostrich, 301
Egret, 294
Egyptian pyramids, 315
melon, 220
tithes, 343
Eider duck, 300
down, 300
Electrical discharges, 351
Electricity, 318, 352
how employed, 319
intelligence by, 320
Electric telegraph, 320
Electro-chemistry, 318
gold and silver plating, 318
magnetism, 318
type, 320
Elements, 360
Elephant, 244
Elizabeth, Queen, 21
Elkington, Mr., 318
Elysian fields, 370
Elytra, 281
Embalming, 368
Emblems, 372
Embroidering, 367
by machinery, 367
Emerald, 76
becomes electric, 76
Emery, 363
Emetic, tartar, 362
Emperor, 307
of Russia, 70
Empire, 306
British, 307

Empire, Mogul, 70
Empires, chief, 307
Empress Catherine, 70
Engine, locomotive, 324
England, geographically divided, 308
bank of, 33
form of, 309
why called Britain, 309
Engraving, 72, 329
voltaic, 320
Entire, or entire butt, 207
Epoch, 310
Epsom salts, 107
Equine race, 242
Equinoctial points, 345
Era, 310
Erato, 372
Ermine, 336
Esculent swallow, 285
Essential oil, 9, 200
Etching needles, 72
Ether, 190
Eugenius IV., Pope, 162
Euphrates tunnel, 340
Euterpe, 372
Evaporation, 31
Evergreens, 163
Everpointed pencils, 334
Expanding, 46
Experiments on moonbeams, 350
Exporting, 112
Extravagance, 262

Fahrenheit, 48
Fairy rings, 222
Falcons, 294, 358
False gods, 348
ideas of, 122
Fates, 372
Feathers, bird of paradise, 301
goose, 298
Feathers, ostrich, 301
Features, 343
February, 312
Feline race, 255
Felspar, 87
Labrador, 88
Felt, 14
Fermentation & effervescence, difference of, 206
Fieldfare, 290
Figs, 202
scarlet, 196
Florin, 210
Fire bricks, 329
damp, 117
how rekindled, 348
opal, 85
Fir, 150, 231
Fir forest, largest, 151
First bank, 332
post office, 338
quarter day, 313
railway act, 321
Fish, cuttle, 264
Fishery, cod, 255
Fixed star, 346
Flax, 10, 17
Fleece, 15
Flint, 83
Florence marble, 107
Fluid, 44
Fly, boat, 281
gall, 132
Spanish, 280
Foil, tin, 52
Fomentation, 228
Footmen, running, 388
Forked lightning, 351
Form of England, 309
Fortis, aqua, 362
Fossils 107
Founder's sand, 82
Fountain, living, 360

Fox, 253
Fragrant myrtle, 178
Frankfort black, 141
Frankincense, 231
French chalk, 102
Friable, 156
Fricolli, 219
Friction, 352
Frigid zones, 343
Frog, 276
edible, 276
Fruit, bread, 168
Fuciformis, 131
Fucus, bladder, 129
Fulcrum, 324
Full moon, 347
Fuller, 218
Fuller's earth, 101
Fur,—beaver, 249
chinchilla, 335
ermine, 336
martin, 335
otter, 273
sable, 335
seals, 272
swan's down, 334
Furnace, 58
kelp, 129
Fustian, 146

Galileo, 346, 354, 355
Gall-fly, 132
nuts, 132
Galvanic influence how exerted, 317
battery, 317
Galvanism, 317
Gambia, 149
Gamboge, 136
Game laws, 303
justified, 303
Gardens, hanging, 315
Garnets, 77
Gas, carburetted hydrogen, 117
natural, 119
oxygen, 68
Gates of Diana's temple, 161
Gaul tithes, 343
Gazelle, 358
Geese, 298
Gemini, 345
Gerard, 227
Ger-falcon, 358
Geysers, 84, 127, 351
Ghee, Indian butter, 237
Gherkins, 220
Giants' causeway, 99
Gigantic telescope, 355
Gilding, 27
by electricity, 320
Gilead, balm of, 160
Gilt, 320
Ginger, 181
black, 181
white, 181
Girder, 151
Glass, Muscovy, 98
opaque and black, 100
Glazed earthenware, 88
Glebe land, 342
Glimmer, 98
Globe, 1, 344
artificial, 343
Gloucester cheese, 237
Gloves, 235
Glue, 250, 265
Glyphography, 331
Goat, 234
Goat's fat, 234
milk, 234
skin, 234
wool, 234
Gobelin, tapestry, 368
God, 1
's goodness, 117
Gods, anger of false, 348

Gold, 24
beaters' skin, 30
coins, 66
how coined, 26
how found, 31
leaf, 29
native state of, 26
pennies, 67
tenacity of, 25
thread, 29
wire, 28
Golden pippin, 228
Gooseberry, 226
Goose feathers, 298
Gourds, 196
Governments, 305
aristocratical, 305
democratical, 305
mixed, 305
monarchical, 305
Grafting, 228
Granite, 106
Grant, Professor, 360
Graphite, 65
Grasses, 314
black squitch, or bent, 210
bullrush, 209
cereal, 203
cotton, 208
florin, or orcheston long, 210
Indian, 12, 208
Italian Rye, 211
jute, 12
meadow fox tail, 209
meadow soft, or Yorkshire white, 210
mountain melick, 210
rough cocks' foot, 210
rough stalked, 210
smooth-stalked, 211
Timothy, or cat's tail, 209
Grasshoppers, 283
Grassrope, 210
Graver, or needle, 329
Grease, carriage, 153
Great Britain, 307
tithes, 342
Greece, wise men of, 315
Green copper, 144
mineral, 139
olive, bottles, 100
paint, 139
salt, 113
turtle, 275
Greening, Christopher, 365
northern, 228
Green Swiss cheese, 238
Greenwich, 345
Gregarious, 244
Gresham, Sir Thomas, 20
Greyhound, 252
Grey linnet, 288
Grit stone, 82
its use, 82
Grocer's currants, 199
Grouse, red, 293
black, 293
white, or ptarmigan, 293
wood, or capercailzie, 293
Gruel, 208
Guana, 276
Guavas, 201
Guinea-fowl, 292
Guineas, why so called, 67
Gutenberg, 7
Gutta percha, 166
its uses, 167
Gum-arabic, 142
and resin, difference, 164
copal, 168
guaiacum, 166
how employed, 166
lac, 138
sandarach, 142, 166

Gum tragacanth, 142
tree, 231
Gunpowder, 359
Gypsum, 104

Habitation, beaver's, 249
Hackney coaches, 353
stand, 353
Haddock, 256
Hail, 114
Hair, 14
horse, 242
pencils, 334
Half and half, 207
Hams, 246
Hanging gardens, 315
Hare, 248, 250
Haricot, or kidney beans, 219
Harness, 266
Harpooner, 267
Hatching chickens, 292
Hawk, 358
Hawker, ballad, 338
Hawking, 358
who might practice, 358
Heat, intensity of sun's, 349
its sources, 348—352
celestial, 350
chemical, 352
electric, 351
latent, 323
mechanical, 352
natural, 351
subterranean, 350
Heathen gods & goddesses, 370
Apollo, 370
Ceres, 371
Diana, 371
Juno, 370
Jupiter, 370
Mars, 370
Mercury, 370
Minerva, 371
Heathen gods and goddesses
Neptune, 370
Venus, 371
Vesta, 371
Vulcan, 370
Heavenly Father's care, 172
Hecla, mount, 84
Hedge-hog, 247
fruit, 225
sparrow, 302
Height of mountains, how shewn, 49
Heliotrope, 86
Hemiptera, 281
Hemisphere, 344
Hemp, 16
for a man of war, 16
Henry I., 255
III., 67
VIII., 206, 290
Herbiverous, 242, 244
Hereditary title, 304
Hermetically sealed, 46
Heron, 294
Herring, 257
bloaters, 258
red, 258
Herschel, Dr., 346, 355
High pressure, 323
Hill, Box, 163
Hills, chalk, 204
Hippopotamus, 246
Hive, bee, 278
how ventilated, 278
Hobby, 358
Holly, 163
Homer, 299
Hone, 96
Honey, 278
guide, 302
Hops, 206
Horns, cow's, 235
Horse, 242

Horse hair, 242
power, 324
radish, 233
Horsewhale, 266
Hot springs, 64
Hours, 313
House sparrow, 289
of Peers, 16
fly, 282
Howard, Catherine, 364
Howdah, 245
Hundreds, or districts, 308
Chiltern, 309
Husbandman's tree, 143
Hydraulics, 327
Hydrogen, 117
Hydrostatics, 327
Hymenoptera, 281

Ice, 123
Iceland, 351
moss, 131
Ichneumon, 276
Incas of Peru, 87
Inclined plane, 325
Incombustible cloth, 108
Incumbent, 341
Indian corn, 203, 208
cotton, 208
wood, 146
India-rubber, 189
how dissolved, 190
vulcanized, 190
Indigenous, 178
Indigo, 133
Indurated, 96
Inflammable, 9
Infusion, 165, 224
Infusion and decoction, difference of, 165
Infusorial remains, 93
Ink, Indian, 264
printing, 9
Ink, red, 132
writing, 9
Inquest, coroner's, 305
Insectivorous, 247
Insects, 278
cochineal, 136
locusts, 283
orders of, 281
Intellectual propensities, 343
Intelligence by electricity, 320
Inventions, century of, 322
Ipecacuanha, 224
Ireland, 307
Iron, 58
blooming, 60
bisulphuret of, 87
bridges, 59
cast, 59
coins, 67
how found, 58
where found, 64
wrought, 60
Isinglass, 277
Island, Canary, 289
of Great Britain, 307
Italian rye grass, 311
Ivory, 245, 265, 275
throne, 271
Ivory-black, 137

James I., 331
January, 312
Japonica, terra, 142
Jaspar, 85
where found, 85
Jerusalem artichokes, 217
Jesuit's bark, 224
Jet, 120
John, King, 158
Joists, 151
Judge, 306
Judges, Three, 370
July, 312

June, 312
Juniper, 166
Juno, 370
Jupiter, 370
statue of, 315
Jurors, 305
Jury, 306
Jute, 12

Kamboja, river, 136
Kelp, 129
furnace, 129
Kercot, oak at, 145
Kermes, 137
Ketchup, mushroom, 222
walnut, 159
Kid, 234
Kidderminster carpets, 337
Kidney, or haricot beans, 219
Kiln, 328
King, 307
Kingdom, 307
animal, 314
mineral, 314
vegetable, 314
Kitton stone, 105
Knowledge, circle of, 1
Koh-i-Noor diamond, 69
Kos, 20
Kraut, sauer, 216

Laboratory, 359
Labrador felspar, 88
Labyrinth of Crete, 316
Lac, 137
gum, 137
seed, 138
shell, 138
stick, 138
Lacquering, 67
Lady-day, 313
Lake in salt mine, 113
pitch, 121
Laminable, 23
Lamp black, 9
how collected, 9
safety, 39, 117
Lamprey, 255
what king said to have died from eating, 255
Land, glebe, 342
Landrail, 296
Lapidary, 93, 263
Lapwing, 296
Lard, 247
Large tithes, 341
Largest diamond, 69
fir forest, 351
oak, 146
Larks, 228
tit, 362
Latent heat, 323
Latitude, 345
Lava, 128, 351
Lavater, 348
Laws, game, 303
Layman, 341
Lazulite, or lapis lazuli, 86
chemical combination to supersede, 90
Lea, Rev. Wm., 21
Lead, 55
black, 65
its uses, 55
oxyde of, 56, 236
where found, 56
white, 139
Leap year, 311
Leather, 242, 245
Leather money, 66
Leeds carpets, 337
Leems, missionary, 238
Leghorn bonnet, 204
Leguminosæ, 219
Lemon, 201
salt of, 201

Length of day, 312
Lentils, 219
Leo, 345
Leopard, 254
Lepidoptera, 281
Levant, 97, 131
Lever, 324
Liber, 345
Libra, 345
Lichens, 131
fuciformis, 131
Iceland moss, 131
roccella tinctoria, 131
Lightning, 351
Ligneous, 114
Lignum vitæ, 166
Limes, 201
Lime, 104
quick, 105
stone, 109
Linen, 10
Ling, 257
Linnæus, 221
Linnet, 288
Linseed oil, 10
Linum, 12
Lion, 254
Liquorice, 187
Litharge, 236
Lithography, 331
Litmus, 131
Living fountain, 360
Llama, 239
fleece, 240
Loadstone, 63
Locomotive engine, 324
Locust, 283
vegetable, 283
where eaten, 283
Logwood, 132
Longest day, 313
Longitude, 345
Looking glasses, 49
Lords, 304
Lord Chancellor, 16
Lord Mayor, 277
Lord's Prayer, 6
Louis XIV., 70
Low pressure, 323
Lucernal microscope, 354
Lunar months, 311
Lynx, 254

Macaroni, 204
Mace, 179
Maceration, 165
Machine, carding, 13
doubling, 14
drawing, 13
opening, 12
roving, 13
scutching, 13
self-acting mule, 13
sewing, 367
slubbing, 13
throstle, 14
tanning, 253
Machinery, result of, 22
Mackerel, 265
Madder, 131
Magnesia, 108
its important uses, 108
Magnet, 62
Magnetised needle, 63
Mahogany, 149
Maintenance of clergy, 322
Maize, 203, 208
paper made from, 225
Malachite, 139
Malaga, 199
Malleable, 23
Mallet, 10
Malt, 205
Manganese, 141
Mangel wurzel, 214
Mangoes, 230

Manna, 143
Man's outward senses, 315
Maple, 160
sugar, 160
vinegar, 161
wine, 161
Map, points on, 64
Marble, 104
Florence, 107
March, 312
Marine animals, 265
Marmotte, 249
Marl, 107
Marquis of Worcester, 322
Mars, 370
Marsh marygold, 176
Martial pyrites, 87
Martin, 284
chimney, 284
sand, 284
swift, 284
Mary and William, 333
Virgin, 113
Marygold, 176
Mast, beech, 157
Mastiff dog, 251
Mausoleum of Mausolus, 315
May, 312
Mead, 279
Mechanical powers—
inclined plane, 325
lever, 325
pulley, 326
screw, 325
wedge, 326
wheel and axle, 326
sources of heat, 352
Medlars, 229
Meerschaum, 101
Melchisedec, 342
Melon, 220
Melpomene, 372
Mercurial barometer, 48
Mercurial thermometer, 47
Mercury, 44, 370
Merlin, 358
Metal pens, 298
Metals, 23
bell, 66
Britannia, 65
how found, 23
how many, 24
how separated, 23
most malleable, 25
perfect, 25
Mezzotinto, 331
Mica, 98, 102
Michaelmas day, 314
Microscope, 354
lucernal, 354
solar, 354
Midsummer day, 314
Migratory birds, 283
Milk, asses', 243
Mill-board, 5
Millet, 184
bread, 184
sugar, 184
vinegar, 184
Milts, 265
Mimosa, 142
Mineral green, 139
kingdom, 314
water, 126
Minerva, 371
temple of, 326
Mines, 37
copper, 40
gold, 32
lead, 37
salt, 110
Scottish, 33
silver, 37
united, 350
Minos, 370
Mint, 232

Mint, pepper, 232
spear, 232
Mirror, burning, 348
Missionary Leems, 238
Mistletoe, 250
Mixed governments, 305
Modern and ancient work, 316
Mogul empire, 70
Monarchical government, 305
Money, 26
gold, 67
iron, 66
leather, 66
not always made of metals, 66
pasteboard, 66
tin, 67
where only allowed to be coined, 26
Monks of St. Bernard, 252
Montague, Mrs., 21
Months, 311
lines to remember, 317
Moon, 311, 347
beams, 349
stone, 88
Moral governments, 305
sayings, 315
Mordants, 132
Morocco leather, 235
Morrells, 222
Moss, Iceland, 181
aquatic, 120
Mother of pearl, 263
Moulds, 59, 82
Mountains, height of, how shewn, 49
Moveable shield, 240
Mount Hecla, 84
Mulberry, 159
Mules, 243
Murdoch, Mr., 119
Muriate of soda, 110
Muses, The
Calliope, 372
Clio, 372
Erato, 372
Euterpe, 372
Melpomene, 372
Polyhymnia, 372
Terpsichore, 372
Thalia, 372
Urania, 372
Musselmen pilgrims, 243
Mutiny, 169
Myrrh, 231
Myrrha, balsamodendron, 231
Myrtle tree, fragrant, 178
Muscovy glass, 98
Muses, 371
Mushrooms, 221
Musk, 239
Mustard, 233
Mutton 234

Nacre, or mother of pearl, 263
Names of diamonds, 70
Nankeen, 14
Naphtha, 120
Narcotic, 123
plant, 174
Narwhale, 271
Nasturtium, 176
Natural divisions of the earth, 306
alum, 362
day, 312
gas, 119
sources of heat, 351
Necessity, daughters of, 372
Nectarine, 226
Needle, or graver, 329
Needles, 365
etching, 72
made by steam, 366

Needle, magnetized, 68
Neptune, 370
Newcomen, 322
Newfoundland dog, 252
New moon, 347
year's day, 311
News, transmitting, 338
Newton, Sir I., 68, 346
Nidus, 137
Nightingale, 287
Night-shade, 175
Nitrate of Silver, 36
Nitre, 359
Nitric acid, 33, 362
Nitro-muriatic, 33
Neuroptera, 281
Noble opal, 85
Nodes, 347
Nopals, 137
Norfolk, Duke of, 274
Northern greening, 228
North frigid zone, 343
pole, 343
No-tsing, 119
Noureddin Mahmoud, 287
November, 312
Nut, cocoa, 155
Nutmeg, 179

Oak, 144
at Kercot, 145
bark, 146, 253
largest, 146
prickly-cupped, 133
quercus robur & quercus sessi-flora, 145
Oatmeal, 208
Oats, 208
Obscura, camera 356
Occidental diamond, 70
Ochre, 96
October, 312
Oil, 9
Oil, Betton's British, 120
Colza, 215
essential, 9, 153
fixed, 9
of turpentine, 153
Oldfield, 229
Olive green bottles, 100
Onyx, 84
Oolite, 105
Opalescent, 76
Opals, 85
where found, 85
Opening machine, 12
Opium, antidote to, 174
Optical glasses, 354
Orange, 199
bitter, or Seville, 200
flowers, essential oil of, 200
St. Michael, 200
sweet, or China, 200
Orchil, 131
Orchis, 165
Orders of insects, 281
Ores, 24
Organic remains, 127
Organized bodies, 127
Organs of plants, 127
Oriental diamond, 70
ruby, 74
Origin of coal, 114
Orris root, 184
Orthoptera, 281
Ortolan, 303
Ostrich, 301
eggs, 301
feathers, 301
Otter, 273
Ounce, 254
Outward senses of man, 315
Otto of roses, 200
Owls, 290
Oxalic acid, 108

Oxide, 46, 53
black, 50
of antimony, 122
cobalt, 140
iron, 63
lead, 236
Oxygen gas, 68
Oysters, 263
pearl, 261

Pachydermata, 244
Pacific ocean, 169
Packing-cloth, 11
Paddy bird, 335
Pain, 370
Paint, black, Frankfort, 141
green, 139
Palace of Cyrus, 315
crystal, 69
Palm Sunday, 154
fruit, 155
wine, 154
Palo de vaca, or cow tree, 171
Panama, 175
Panther, 254
Paper, 2, 231
blue test, 131
brown, 5
improvement in, 5
maize, 225
rice, 219
Papyrus, 231
Paradise, bird of, 301
Parasites, 282
Parchment, 30
Parliaments, 304
Parmasan cheese, 237
Parsnips, 214
Pasqua, 174
Passage, birds of, 258
Paterson, W., 333
Paving tiles, 329
Peach, 226
Peacocks, 291
crests, 296
Pearls, 261
Cleopatra's, 262
how dissolved, 262
its value, 263
from Conway, 262
how procured, 261
made of bleak, 260
mother of, 263
pear-shaped, 262
Roman, 260
seed, 263
Pearlash, 109
Pearl barley, 206
Pears, 229
Peas, 218
Peat, 120
pressed to resemble coal, 120
Pebbles, 81
Peers, house of, 16
Pelican, 300
Pencils, 334
ever-pointed, 334
hair, 334
Pendulum, 355
Penny, gold, 67
post, 339
Pens, 298
Pepper, 177
black, 177
cayenne, 178
mint, 232
white, 177
Perch, 265
Percussion, 352
Peregrine, 358
Perennials, 17
Periander, 315
Perry, 229
Persian carpets, 337
Peru, balsam of, 232

Peru, incas of, 87
Peruvian bark, 224
Petrifying water, 97
Petroleum, 120
Pewit, 296
Pewter, 53
Pharos tower, 315
Pheasant, 291
Philip II., 199
Philosopher's stone, 122
Phosphorus, 109
Photography, 356
Phrenology, 343
Physiognomy, 343
Pickled walnut, 152
Pigeons, 286
carrier, 286
domestic, 286
fantail, 287
passenger, 287
ring dove, 287
tumbler, 287
Pigs, 246
Pilchard, 258
Pilgrims, Musselmen, 343
Pillar, Pompey's, 348
Pimento, 178
tree, 178
Pine wood, 151
Pins, 363
first made here, 364
money, 365
Pipe clay, 92
for cleaning, 92
Pippin, 228
golden, 228
Pisces, 345
Piston, 322
Pitch, Burgundy, 153
lake, 121
Pittacus, 315
Pitt diamond, 70
Plane, inclined, 325
Planet, 346
Plantain, 169
Plants, organs of, 127
containing camphor, 164
Plaster, court, 232
Plated goods, 34
Platina, 38
how melted, 38
its properties, 38
Plating, how discovered, 35
Pliny, 100, 161, 273
Plott, Dr., 145
Plumbago, 65
where the best mine, 65
Plum, wild, 225
Pocketbook leaves, 248
Podurella, 282
Points, 345
on the map, 64
Poles, 343
Political divisions of the earth, 306
Polyhymnia, 372
Pomegranate, 203
Pompey's pillar, 348
Pompion, 221
Population of Gt. Britain, 308
Porcelain, 89
clay, 88
flint used in, 91
Porcupine, 248
Porous, 94
Porpoise, 274
Porter, 207
Portland stone, 106
what built of, 106
Ports, cinque, 309
Portugal, king of, 69
Post office, origin of, 338
first, 338
masters, 339
penny, 339
Potash, 108

Potatoe, 213
Potter's clay, 88
its uses, 88
Pounce, 143
Poultices, camomile, 223
Poultry, domestic, 292
Poverty, 370
Powder blue, 133, 141
curry, 136
diamond, 71
Power, steam, 316, 324
horse, 324
mechanical, 324
Prairie dog, 249
Praying mantis, 281
Press, printing, 6
rolling, 330
Pressure, 352
hydrostatic, 327
steam, 324
Prey, birds of, 357
Prickles, or spines, 247
Prickly cupped oak, 136
Prince of Wales, 54
Printing, 5
calico, 142
copper-plate, 330
from wooden blocks, 6
ink, what made of, 9
letter-press, 6
movable types, 7
popular belief, 6
types, 55
who first invented, 6
Prism, 80
Proclus' burning mirrors, 348
Properties of electricity, 316
Propensities, 343
Protective surfaces, 320
Prudence, 376
Prussic acid, 202
Ptarmigan, 293, 336
Puffin, 284
Pulley, 326
Pulse, 283
Pumice stone, 128
Pumpkin, or pompion, 221
Pump, spiral, 325
Putty, 363
Pyramids, 315
Pyrites, 87

Quarter days, 318
Quartz, 79, 116
Quassia, 232
Queen bee, 279
Queensware, 91
Quercus robur, 145
semi-flora, 145
Quick-lime, 105
Quicksilver, 44
how frozen, 45
its properties, 44
many uses of, 45
story of its discovery in India, 51
where found, 51
Quills, goose, 298
Quince, 230
Quinine, 224

Rabbit, 250
Race, feline, 255
equine, 242
Radamanthus, 370
Radiated, 76
Radish, horse, 238
Rafters, 95
Rags, 2
Rail roads, 316, 321
Birmingham, 322
Croydon, 321
Darlington, 321
first act for, 321
Stockton, 321
Wandsworth, 321

Raisins, 199
Rape, 215
seed, 215
Raleigh, Sir Walter, 175, 213
Raphael, 367
Raptores, 358
Rasa, 210
Raspberry, 225
Rat, 248
Ravens, 289
Rector, 341
Redbreast, 288
Red currants, 227
chalk, 95
clover, 211
grouse, 293
herring, 258
lead, 56
sealing wax, 138
streak, 228
wortleberry, 225
Redstreak, 228
Reed pen, 299
common, 212
Reeve, 295
Rein deer, 238
Remains, organic, 127
fossil, 107
infusorial, 93
Rennet, 237
Rent charge, 342
Reptiles 282
early existence, 128
Republican governments, 305
Resin, 153
and gum, difference, 164
Rhinoceros, 245
Rhipiptera, 282
Rice, 185
Rice paper, 219
Ridings, origin of, 308
Rising sun, 313
River Achates, 83
River Arno, 204
horse, 246
Rocks, 127
crystal, 80
primitive, 127
salt, 110
secondary, 128
volcanic, 128
Rodentia, or gnawing, 248
Rodney, admiral, 180
Roe stone, 105
Roger Bacon, 359
Rolling press, 330
Roman bricks, 328
pearls, 260
roads, 316
tithes, 343
Roofing, slate, 93
tiles, 329
Root, arrow, 185
Rooks, 289
useful to farmers, 289
Rope, grass, 210
Rose diamonds, 71
Roses, attar or otto of, 200
Rosewood, 159
Rosse's, Lord, telescope, 355
Rotten stone, 93
Roccella tinctoria, 131
Rough diamonds, 71
Royal George, raising the, 316
Rubber, India, 189
Ruby, 74
oriental, 74, 76
where found, 75
Ruffs, 295
Ruminating animals, 233
Running footmen, 338
Rushes, 337
Rushbottom chairs, 209
Russia, emperor of, 70
Russet, 228
Rye, 207

Rye, bread, 207
Mr. Cobbett's invention, 208
straw, 207

Sable fur, 335
Saddle-trees, 160
Safety lamp, 117
Saffron, 183
substitute for, 185
Walden, 184
Sagittarius, 345
Sago, 155
Sails of ships, 334
Salep, 165
Salmon, 257
Saloop, 165
Salt, common, 110
green, 113
mines, 110
wonderful one near Cracow, 110
of lemon, 201
rock, 110
sea water, 113
spica, 113
Salts, Epsom, 107
Samphire, 130
where found, 130
Sand, 82
eels, 277
founders, 82
hills and plains, 82
martin, 284
stone, 82
Sandam, 367
Sandarach, 142, 166
Sapphire, 75
Sassafras, 165
Saurians, 128
Sauer kraut, 216
Saviour, Our, 54
Sawdust, 146, 166
Sayings, moral, 315
Scallop, 264
Scarlet dye, discovery of, 368
figs, 196
Schœffer, 7
Schwartz, Bartholomew, 359
Science of time, 310
Scoria, 103
Scorpio, 345
Scotch fir, 151
Screw, the, 325
Seal, 272
skin, 272
Sealed earth, 101
hermetically, 46
Sealing wax, 138
Sea eel, 276
froth, 101
horse, 265
mat-weed, 212
ports, 310
tortoise, 275
unicorn, 271
weed, 128
Seasons, the, 311
Seed, anise, 183
carraway, 182
coriander, 183
lac, 138
Second quarter day, 314
Semi-opal, 85
Semiramis, 340
Semolina, 204
Senses, outward, of man, 315
Sentimental propensities, 343
September, 312
Serpents, 281
Sessi-flora, 145
Setting sun, 313
Seven wise men of Greece, 315
wonders of the world, 315
Seville orange, 200
Sewing machine, 367

Shaddock, 200
Shaft, 116
Shagreen, 243
Shaw, Dr., 219
Shawls, 234
Sheep, 233
Sheet lightning, 351
Shell lac, 138
Shepherd's dog, 251
Shield, moveable, 340
Ship Bounty, 169
sails of, 334
Shortest day, 313
Shoemaker's wax, 153
Shoes, 235
Shrubs containing camphor, 164
Siberian dog, 252
Siculus, Diodorus, 340
Sieves, 43
Signalling apparatus, 321
Signs of zodiac, 345
Silex, 83
Silica, 363
crystallized, 79
Silk, 18
Aristotle's account of, 20
how taken to Constantinople, 19
raw, 18
Stockings, given to Edward VI. and Queen Elizabeth, 20
weaving, 23
what done with at Kos, 20
worms, 19
Silver, 33
great malleability of, 35
nitrate of, 36
pure, 36
wire, 34
Size, 4
Skin, asses, 243
Skin, beaver, 249
goldbeater's, 30
Skins, how prepared, 253
Skull, 343
Skylark, 228
Slate, 93
alum, 362
clay, 93
drawing, 95
pencils, 95
roofing, 93, 94
writing, 94
Sledge, 238
Sloe, 225
Small tithes, 342
Smalt, 140
Smelt, 257
Snake cucumber, 220
Snow, 114
Snuff, 175
Soda, 130
muriate of, 110
Sol, 346
Solar microscope, 354
system, 346
Solon, 315
Solstitian points, 345
Sonorous, 66
Souchong, true, 192
why scarce, 192
Sounding-board, 152
Sources of heat, 350
South frigid zone, 343
pole, 343
Southwark bridge, 59
Sovereign, the, 304
Spaniel dog, 251
Spanish fly, or cantharides, 250
Spar, Derbyshire, 104
Sparks, diamond, 73
Sparrow, 302
Spawn, 257
Spearmint, 233

Speculum, 348
Spermaceti, 270
Spider-web, 18
Spines, or prickles, 247
Spiral, 325
Spirits of wine, 363
Spitalfields, 23
Sponge, 360
Spring, 311
watch, 355
Springs, hot, 84
Spruce fir, 231
Spurs, 36
silver, story of, 36
Squash, 229
Squirrel, 248
Starch, 203
Star fixed, 346
stone, asterias or, 76
Stars and planets, 346
State, 307
Statues, who improved, 333
of basalt, 100
of Jupiter, 315
of Virgin Mary, 113
Steam, 123, 322
cylinder & piston, 322
engine, 322
power of, 324
pressure, 324
Steel, 60
damask, 61
in medicine, 62
mirrors, 62
ornaments, 61
what used for, 61
Stereoscope, 355
Steward of the Chiltern Hundreds, 309
Stick lac, 138
Stiletto-handles, 78
Stilton cheese, 237
Stoat, 336
Stocking frame, 21
by whom invented, 21
Stockton railroad, 321
Stomach, calf's, 237
Stone, 105
Bath, 105
Kitton, 105
lithographic, 331
roe, 105
rotten, 93
philosopher's, 122
Portland, 105
pumice, 128
ware, 91
Stourbridge clay, 329
St. Bernard, monks of, 252
St. Peter's, at Rome, 161
Stratum, chalk, 83
Strawberry, 224
wild, 225
Straw, wheat, 203
Sturgeon roe, 260
Stylus, 299
Styrax, 232
Substitute for saffron, 135
Subterranean heat, 350
Sugar maple, 160
Sulphate of copper, 139
iron, 143
magnesia, 107
Sulphur, 41
Sumach, 231
Summer, 311
Sun, brazen image of, 315
Sunday, Palm, 154
Sun's apparent path, 346
heat, 349
Superstition, a, 250
Surfaces, protective, 320
Swallow, 284
chimney, 284
esculent, 284
martin, 284

Swallow, sand, 284
swift, 284
Swan, 297
once eaten, 297
wild and tame, 297
Swan's down, 334
Swarm of bees, 279
Swedish turnip, 215
Sweet bay, 165
cassava, 187
olive flowers, 195
wort, 205
Swift swallow, 284
Swiss cheese, green, 238
how flavoured, 238
System, solar, 346

Talc, 102
Tale of Robert Bruce, 251
Tallow tree, 230
Tamarinds, 201
Tame swan, 297
Tan, 253
Tanning, 253
Tape, 12
Tapestry, 367
Bayeux, 368
Gobelin, 368
Tapioca, 186
Tar, 153
Tartar, 362
cream of, 362
emetic, 363
Tartarus, 370
Taurus, 345
Tavernier, 262
Tea, 190
black, Bohea or Bozee, 191
Congo, or Congo Foo, 192
fresh, leaves, bad effects of, 195
Tea, green, how made, 193
gunpowder, 194
how drank in China and Japan, 195
Hyson, 193
Pekoe, 193
perfumed, 195
Singlo, 193
Souchong, 192
Teak, 147
Teazel, 212
Telegraph, electric, 320
Telescope, 354
Galileo's, 354
Herschell's, 355
Lord Rosse's, 356
Temperate zone, 344
Temperature, 46
Temple of Diana, 161, 315
Minerva, 326
Tench, 260
Tendons, 266
Teneriffe, 198
Tent, 197
Teredo worm, 340
Termites, 281
Terpsichore, 372
Terra japonica, 142
Terrier, why so called, 252
Territory, 307
Test paper, blue, 131
Thales, 315
Thalia, 372
Thames tunnel, 340
Thermometer, 45
mercurial, how constructed, 47
who invented, 48
Thibet, 81
Third quarter day, 313
Thread, 17, 271
Three threads, 207
Thysanoures, 282

Tiger, 254
Tiles, 329
Time, science of, 310
Tin, 52
block, 54
duty on, 54
foil, 52
plates, 52
Tinctoria roccella, 131
Tithes, 341
Babylonian, 343
Egyptian, 343
Gaul, 343
great, 342
small, 342
whence traced, 342
Titlark, 302
Tobacco, 174
droll story about, 175
pipes, 92
Tobago, 174
Toddy, 155
Tolu, balsam of, 232
Topas, 76
aqua marina, blue, 77
Tops, turnip, 215
Tokay, 198
Torrid zone, 344
Tortoise, 274
shell, 275
Totworth, tree at, 158
Tourmaline, 78
curious property of, 79
fine, in Brit. Mus., 79
where found, 79
Tous les mois, 186
Tow, 11
Tragacanth gum, 142
Transmitting news, 338
Traveller's tree, 172
Travelling plant, 225
Tree, alder, 156
almond, 202
Tree, ash, 143
banyan, 196
bay, 165
beech, 156
birch, 156
box, 162
camphor, 164
of Japan, 164
cedar, 152
chestnut, 157
cinchona, 224
citron, 201
cork, 188
cow, 171
current, wild, 227
cypress, 161
date, 154
evergreen, 163
figs, 202
fir, 150
fragrant myrtle, 178
gambia, 149
holly, 163
juniper, 166
lemon, 201
lignum vitæ, 166
lime, 201
mahogany, 149
mangoe, 230
maple, 160
sugar, 160
medlar, 229
mulberry, 159
oak, 144
orange, 200
palm, 154
palo de vaca, 171
pear, 200, 229
pimento, 178
pine, 151
rosewood, 159
shaddock, 200
styrax, 232

Tree, tallow, 230
tamarind, 201
teak, 147
traveller's, 172
walnut, 159
yew, 168
Trefoil, or clover, 211
Trethings, or trithings, 308
how corrupted, 308
Trial by combat, 337
Tripoli clay, 92
Tropical, what meant by, 176
Tropics, 176, 344
True solar system, 346
Truffles, 223
how eaten, 223
procured by dogs and pigs, 223
Tube, 45
Tunnel, 340
Euphrates, 340
Thames, 340
Turbot, 264
Turkey, the, 290
carpets, 337
stone, 97
Turmeric, 135
Turnip, 215
Swedish, 215
Turpentine, 153
oil of, 153
Turtle, 275
green, 275
Tuscany, 84
Twopenny post, 207
Types, printing, 7, 55
how made, 7

Ulloa, Don Antonio, 88
Ultramarine, 86
artificial, 141
chemical discovery to supersede, 90
Umbelliferous, 182
Umber, 140
Umbrella, 353
Unicorn, sea, 271
United mines, 350
Urania, 372
Use of oak sawdust, 146

Valuable pearl, 262
Valve, self-acting, 322
Vapour, 123
noxious, 126
Variation in surface of skull, 343
Varnish, 168
copal, 168
Vauxhall bridge, 59
Veal, 236
Vegetable kingdom, 314
locust, 283
coal, origin of, 114
Vellum, 30
Velvet, 18
Veneers, 150
Venezuela, or Caraccas, 171
Venus, 371
Verdigris, 43
Verjuice, 199
Vermicelli, 204
Vermillion, 50
Vermin, destruction of, 290
Vesta, 348, 368, 370
fire how rekindled, 348
Vetches, 219
Viaduct, 328
Vicar, 341
Vinegar, maple, 161
Violin, 152
Virgin Mary, statue of, 113
Virgo, 345
Vitæ, lignum, 166
Vital heat, 371
Vitriol, blue, 139

Vitriol, spirit of, 238
Volatile oil, 9
Volcanic rocks, 128
Volcano, 84, 351
Voltaic engraving, 320
Vulcan, 370
Vulcanized India rubber, 190
Vulture, 357
aquiline, 357
carrion, 356
eagle, 357

Wafers, 138
Wager of battle, 337
Wales, prince of, 54
Walnut, 159
Walrus, 265
Wandsworth railway, 321
Warp, 14
Wasps, 281
Watch tower, 315
Watches, 355
Walden, Saffron, 184
Walls of Babylon, 315
Walter Raleigh, 175, 213
Water, 123, 131, 361
melon, 220
mineral, 126
peppermint, 232
petrifying, 97
rain, 124
river, 125
sea, 126
snow, 124
spring, 125
stagnant, 125
Thames, 125
wagtail, 302
Waterton, on the heron, 295
Watt, James, 119, 322
what led to his improvements in the steam engine, 322
Wax, bees', 278
candles, 28
sealing, 138
shoemaker's, 153
Weather, changes in, 48
how ascertained, 49
Weaving, 11
Web, spider, 18
Wedge, 326
Wedgewood's queen's ware, 91
Weed, bladder fucus, 129
Weeds, sea, 128
Weeks in a year, 312
month, 312
Weft, 14
Weld, or wold, 134
Wells, artesian, 326
Westphalia hams, 246
Whale, 266
ambergris in, 270
blubber, 267 [270
blunt-headed chalot,
bone not bone, 268
fin-backed, 270
horse, 266
how caught, 267
oil, 267
sperm, 270
Wheat, 203
Wheel and axle, 326
Whetstone, 96
Whey, 237
Whips, 269
Whirlicote, 353
White ant, 281
clover, 211
currant, 227
ginger, 181
grouse, 293
lead, 56, 139
pepper, 177
Whiting, 368
Whortleberry, 225

Wild boar, 246
cinnamon, 181
currant, 227
hedge fruit, 225
pears, 229
plum, 225
raspberry, 225
swan, 297
William I., 310
William and Mary, 333
William Paterson, 333
Wilson, American ornithologist, 287
Wilton, 337
Wiltshire cheese, 237
Window glass, substitute, 269
Windsor bricks, 329
Wine, 197
antimonial, 123
Burgundy, 197
Canary sack, or Malmsey Madeira, 198
Cape, 199
Champagne, 197 [198
sparkling and still,
claret, 197
Constantia, red and white, 199
Frontignac, 198
Hock, 198
Lachryma Christi, 198
Lisbon, 197
Madeira, 198
maple, 161
Moselle, 198
mountain, 198
Muscadel, 198
palm, 154
Port, 197
red and white, 197
Rhenish, 198
Sherry, 197
spirits of, 363
Wine, Teneriffe, 198
Tent, 197
Tokay, 198
Winged reptile, 283
Winter, 311
Wire, gold, 28
silver, 34
Wise men of Greece, 315
Woad, 133
Wolf, 252
Women of Kos, 20
Wonders of the world, 315
Wood, Brazil, 132
box, 163
durable, 161
Indian, 148
maple, 161
opal, 85
pine, 151
rose, 59
teak, 147
Wooden dishes, 160
hammer, 10
Woodcuts, 163
Woodlark, 288
grouse, 293
Woof, 11
Wool, 15
comber, 16
sack, 16
Worcester, marq. of, 322
Work, ancient & modern, 316
Working bee, 178
Works, Anglesea copper, 42
World, wonders of the, 315
Worsted, 16, 336
Writing slates, 94
Wrought iron, 60
Wurzel, mangel, 214

Yams, 213
seed, 292
Yanippa, manihof, 186

Year, 311
civil, 213
leap, 311
months in a, 311
Yeast, or barm, 206
Yellow dye, 134
Yew, 168
Zaffre, 140
Zebra, 244
Zetlanders, 15
Zinc, 44
Zodiac, 345
Zonaras, 348
Zones, 176, 343, 344

ERRATA.

Page 2, line 11, *for* rages *read* rags
— 19, — 7, *for* know *read* known
— 50, — 6, *for* amalgamate *read* an amalgam
— 72, — 21, *for* Bornea *read* Borneo
— 106, — 19, *for* Attalc *read* Altai
— 138, — 8, *for* lack *read* lac
— 148, — 28, *for* Portugal *read* Bengal
— 149, — 7, *for* mahogony *read* mahogany
— 171, — 16, *for* track *read* tract
— 206, — 3, *for* spontaneous *read* spontaneously
— 211, — 14, *for* generally foot *read* gonerally a foot
— 219, — 27, *for* it *read* the plant
— 224, — 16, *for* does *read* do
— 237, — 15, *after* thin *insert* liquor
— 238, — 28, *for* they *read* rein-deer
— 240, — 14, *for* Manistania *read* Mauritania
— 244, — 11, *for* Pachy domata *read* Pachydermata
— 261, — 18, *for* he *read* the diver
— 266, — 8, *for* seldges *read* sledges
— 278, — 12, *for* swarm *read* swarms
— 294, — 5, *omit* they were then ranked among royal game
— 296, — 3, *for* pewets *read* pewits
— 299, — 3, *for* was *read* were
— 354, — 14, *begin the answer with* It is

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